

# Revision of *Logania* R. Br. section *Stomandra* (R. Br.) DC. (Loganiaceae)

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## Abstract

Conn, Barry J. (National Herbarium of New South Wales, Royal Botanic Gardens, Mrs Macquaries Road, Sydney NSW 2000 Australia) 1994. Revision of *Logania* R. Br. section *Stomandra* (R. Br.) DC. (Loganiaceae). *Telopea* 5(4): 657–692. *Logania* section *Stomandra* (Loganiaceae) consists of twelve species occurring in Western Australia (particularly in south-western Western Australia), South Australia and eastern Australia. *Logania biloba*, *L. centralis*, *L. exilis* and *L. judithiana* are described as new. Two subspecies are recognised in *Logania serpyllifolia*, namely subsp. *serpyllifolia* and subsp. *angustifolia*. Keys, descriptions, synonymy, illustrations and distribution maps are provided for all taxa.

## Introduction

Although various State flora accounts have been published, the most recent account of all Australian species of the genus was by Bentham over 120 years ago (Bentham 1869). The number of additional collections since that time have made it necessary for this current study of the genus to be undertaken so that the account of the genus for the *Flora of Australia* project will be based on a modern study. This paper presents the taxonomic conclusions of a revision of *Logania* section *Stomandra*, one of two sections recognised. The systematics of *Logania* section *Logania* will be dealt with in subsequent papers.

## Methods and presentation

Measurements of the morphological characters and subsequent descriptions were taken from 730 herbarium specimens (including duplicates) held at AD, BM, BRI, CANB, CBG, F, K, MEL, NSW, PERTH, UC, US (abbreviations as designated in Holmgren *et al.* 1990).

The distribution summary and the citation of selected specimens are grouped according to various regional subdivisions. The subdivisions used for Western Australia follow Beard (1980); those for Queensland follow the pastoral divisions as in *Contr. Queensland Herbarium* 19 (1975) back end paper; those for New South Wales follow Jacobs & Pickard (1981); those for South Australia follow Laut *et al.* (1977); and those for Victoria follow Conn (1992a & 1993). Inflorescence terminology follows Briggs & Johnson (1979).

## Systematic treatment

### Brief taxonomic history of genus

Brown described the genus *Logania* (Brown 1810) based on the type of *Euosma* Andrews (1808). Therefore, the name *Logania* was nomenclaturally superfluous and hence, illegitimate

when published. Subsequently, the name *Logania* has been conserved (refer 'Appendix III', Greuter *et al.* 1988). Brown recognised eleven species in the Protologue. These he divided into two main groups (namely, 'I' [un-named] and 'II *Stomandra*'). He subdivided the un-named group 'I' into the two subgroups 'A. *Loganiae verae*' and 'B. *Euosma*'. However, since the type of the genus (*L. floribunda* [= *L. albiflora*]) was included in 'B. *Euosma*', this subgroup typifies *Logania* and subgroup 'A' does not have a valid name. De Candolle (1845) recognised two sections. He included Brown's 'A. *Loganiae verae*' and 'B. *Euosma*' in section '*Eulogania*' [= section *Logania*], maintaining them as distinct subgroups, and included 'II *Stomandra*' in section *Stomandra*. Nees von Esenbeck (1845) treated each of Brown's subgroups and the 'II *Stomandra*' group as sections (*viz.* §) of *Logania*. I support the recognition of two infrageneric sections as circumscribed by De Candolle and followed by Bentham (1869 [1868] (refer Stafleu & Cowan 1976)), namely, *Logania* sect. *Logania* and *L.* sect. *Stomandra*. The taxonomic usefulness of recognising the subgroups of section *Logania* has not been evaluated yet.

### *Logania* R. Br. nom. cons.

*Logania* R. Br., *Prodr.* 454–456 (1810) (*nom. cons.*); Benth., *Fl. austral.* 4: 360 (1869[1868]); Druce, *Bot. Soc. Exch. Club Brit. Isles* 1916: 633 (1917); Black, *Fl. South Austral.* 2nd ed. 4: 687 (1957); Allan, *Fl. New Zealand* 1: 548 (1961); Blackall & Grieve, *How to know Western Australian wildfl.* 3: 545 (1965); Willis, *Handbk plants in Victoria* 2: 520 & 521 (1972 [1973]); Leeuwenberg & Leenhouts, *Pflanzenfam.* 28bl: 33 & 34 (1980); Perry in Jessop & Toelken (eds), *Fl. South Australia* Part II: 1038–1041 (1986); Stanley & Ross, *Fl. SE. Queensland* 2: 287 (1986); Rye in Marchant *et al.* (eds), *Fl. Perth region* 1: 518 & 519 (1987); Conn in Harden (ed.), *Fl. New South Wales* 3: 477–479 (1992).

TYPE: [*Logania floribunda* R. Br. (*nom. illeg.*)] *Euosma albiflora* H. Andrews, *Logania albiflora* (H. Andrews) Druce (*typ. cons.*) [refer Typification notes below].

HOMOTYPIC SYNONYM: *Euosma* H. Andrews, *Bot. Repos.* 8: t. 520 (1808). TYPE: *Euosma albiflora* H. Andrews.

HETEROTYPIC SYNONYM: *Nautophylla* Guill., *Mem. Mus. Hist. Nat., Paris (Bot.)* 4: 44, f. 13 (1953). TYPE: *N. imbricata* Guill. (= *L. imbricata* (Guill.) Steen. & Leenh., *Bull. Jard. Bot. Bruxelles* 32: 440 (1962).

Herbs, undershrubs or shrubs. Leaves opposite, sometimes greatly reduced, petiolate or sessile; stipules interpetiolar, membranous; margin entire. Inflorescence terminal, often appearing axillary when developing from short lateral shoots, variously cymose (botryoidal or branched-botryoidal), 1–many-flowered. Flowers usually small, bisexual or unisexual and then plants dioecious; calyx, corolla and androecium usually 5-merous. Calyx lobes obtuse to acute; margin ciliate. Corolla white or yellow, campanulate or with tube cylindrical; lobes imbricate in bud, rounded at the apex or nearly so, ± entire, spreading. Stamens inserted about halfway up the corolla tube or in the throat, included to just exerted; anthers orbicular to narrowly oblong. Ovary ovoid or nearly so, 2-loculate, with several ovules in each locule; style thick, included or exerted; stigma large, subglobose (capitate) or oblong, undivided or bilobed. Fruit a septicial capsule, subglobose or ellipsoid, with two carpels almost completely separating from apex to base, apiculate at apex; valves coriaceous, usually black, woody; seeds ± ellipsoid, brown; embryo cylindrical; endosperm starchy.

DISTRIBUTION: About 25 species, of which one is endemic in New Caledonia, one in New Zealand, and the remainder in Australia.

TIPIFICATION: When Brown described *Logania* (Brown 1810), the name *L. floribunda* is superfluous and hence illegitimate since he cited *Euosma albiflora* as a synonym.

### Key to the Sections of *Logania*

The following couplet is a modification of the descriptions provided by Bentham (1869).

- 1 Calyx lobes obtuse; stamens inserted in the middle of the tube; anthers included; branches woody, at least at the base; flowers dioecious, probably never bisexual ..... section *Logania*
- 1: Calyx lobes usually acute to tapering; stamens inserted in the throat; anthers exerted, but not exceeding the corolla lobes; herb or undershrub; flowers usually bisexual ..... section *Stomandra*

**Logania** section *Stomandra* (*R. Br.*) DC.

*Logania* section *Stomandra* (*R. Br.*) DC., *Prodr.* 9: 26 ([January] 1845)(as 'Sectio II. *Stomandra*'); Nees von Esenbeck in Lehmann, *Pl. preiss.* 1: 366 ([August] 1845)(as '§ 3. *Stomandra*'). Basionym: *Logania* II *Stomandra* *R. Br. Prodr.* 456 (1810). Based on *Logania campanulata*, *L. pusilla* and *L. serpyllifolia*.

TYPE: (here designated): *Logania campanulata* *R. Br.* (refer 'Typification' notes below).

Characters as given summarised in 'Key to Sections of *Logania*' (see above).

DISTRIBUTION: All species of this Section are confined to south-western Western Australia, except for *Logania pusilla* (which occurs only in eastern Australia), *L. centralis* (confined to the drier central regions of Western Australia and Northern Territory) and *L. nuda* (which occurs in the drier regions of Western Australia, South Australia, New South Wales and Victoria).

TYPIFICATION: *Logania* section *Stomandra* is based on the three species, *L. campanulata*, *L. pusilla* and *L. serpyllifolia* (refer protologue of basionym, Brown 1810). *Logania campanulata* is here chosen as the type of the name *Logania* section *Stomandra* because the protologue of this species, including the type specimen (*Brown s.n. [Bennett 2921]*), is in close agreement with the protologue of section *Stomandra*.

NOMENCLATURE: Since De Candolle's *Prodromus systematis naturalis regni vegetabilis* was published in January 1845 (Stafleu & Cowan 1976) and Lehmann's *Plantae Preissianae* was published in August 1845 (Stafleu & Cowan 1979), De Candolle is credited with formally recognising the '*Stomandra*' group (*sensu* Brown) as Section *Stomandra*.

### Key to species of *Logania* section *Stomandra*

- 1 Leaves conspicuous, usually at least 5 mm long, variously ovate, elliptic to obovate, or linear or oblong, rarely triangular; plant variously branched or virgate
- 2 Branches more or less terete with many fine to deep longitudinal furrows (usually c. 6 furrows); plant with virgate habit
- 3 Indumentum with hairs patent to spreading, mostly long, 0.1–0.5(–0.8) mm long; corolla white; branches moderately to densely hairy, frequently hispid ..... 1. *L. spermacocea*
- 3: Indumentum with hairs curved and more or less retrorse (especially on ridges), sometimes hairs restricted to grooves and then antrorse to retrorse, minute, <0.1(–0.2) mm long; corolla yellow, sometimes very pale and appearing almost white; branches sparsely to densely hairy, occasionally glabrous

- 4 Stigma 1–1.3 mm long, deeply bilobed (sinus 0.4–0.6 mm long), each lobe flattened-ovoid, strongly divergent distally, with apex of each lobe rounded; style moderately to densely hairy throughout (hairs spreading to slightly antrorse, crinkled, 0.3–0.5 mm long); inner surface of corolla lobes densely papillose, hairs absent; corolla 5.6–8.5(–10.7) mm long ..... 2. *L. biloba*
- 4: Stigma (1.2–)1.6–3.4 mm long, flattened-ovoid, ovoid-cylindrical to ellipsoid-cylindrical, apex often minutely notched (sinus to 0.3 mm long), occasionally deeply lobed with sinus to 0.5(–3) mm long, lobes never divergent distally; style glabrous or sparsely to moderately hairy on basal 1/2 (hairs antrorse, c. 0.2 mm long); inner surface of corolla lobes sparsely to moderately hairy basally, sometimes hairs restricted to narrow arching band, occasionally densely papillose throughout; corolla (8–)10–16 mm long ..... 3. *L. flaviflora*
- 2: Branches subterete, often with a pair of lateral ridges, to ± square in cross-section (angles ridged or narrowly winged); plant with an open or compact, variously branched or virgate habit
- 5 Plant ± virgate, mostly branching from near base; corolla 15–22 mm long
  - 6 Leaves usually crowded such that internodes not readily visible, with margin revolute, usually with only enlarged midrib visible on abaxial surface, 1.5–2.8 mm wide; corolla dark yellow in bud, to almost white when open ..... 4. *L. callosa*
  - 6: Leaves either crowded along branches or well-spaced, but surface of internodes usually visible, with margin slightly revolute, most of abaxial surface visible, 1.9–3.2(–7) mm wide; corolla white ..... 5. *L. campanulata*
- 5: Plant low, branching, erect or spreading; corolla 4–8 mm long
  - 7 Inflorescences on short lateral branches, hence appearing axillary ..... 6. *L. pusilla*
  - 7: Inflorescences distinctly terminal, not on short lateral branches ..... 7. *L. serpyllifolia*
- 1: Leaves small, 0.9–6 mm long, inconspicuous, scale-like and variously triangular; branches appearing leafless; plant with a virgate habit
  - 8 Corolla < 5 mm long, or if to 5.5 mm long then branches ± erect, never tortuous
    - 9 Branches moderately hairy; hairs minute, 0.1–0.2 mm long; outer surface of corolla lobes moderately hairy (especially near base) ..... 8. *L. centralis*
    - 9: Branches glabrous, minutely papillose; outer surface of corolla lobes glabrous or with an occasional hair ..... 9. *L. nuda*
  - 8: Corolla > 8 mm long, or if 5–8 mm long then branches tortuous
    - 10 Pedicel and calyx glabrous; branches tortuous ..... 10. *L. tortuosa*
    - 10: Pedicel and outer surface of calyx densely hairy; branches ± erect, never tortuous

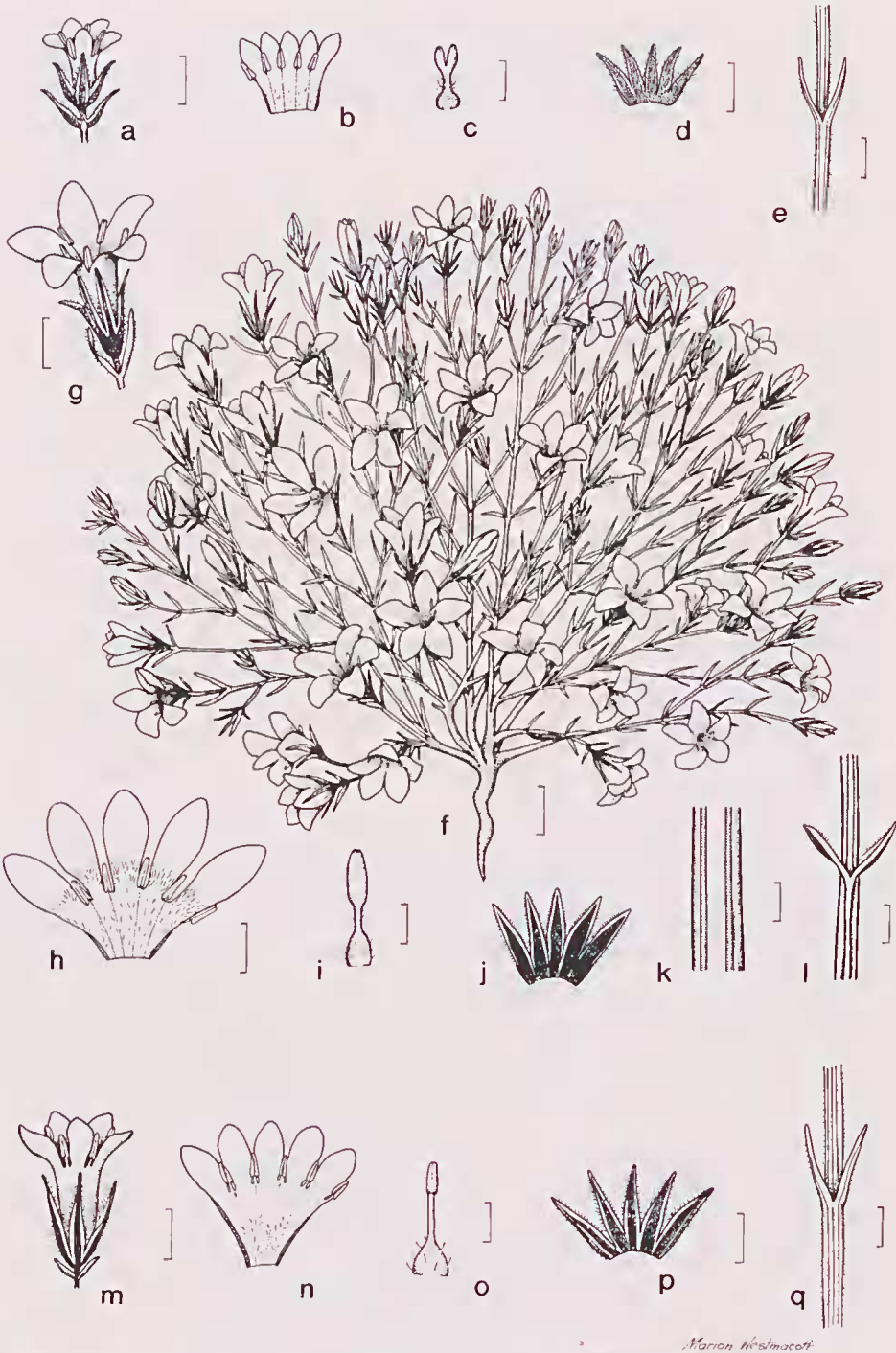
- 11 Plant and branches robust (diameter of branches 1.2–3(–5) mm [average c. 3 mm]); staminal filaments 1.2–1.6 mm long; flowers strongly and unpleasantly aromatic; corolla white with c. 1/2 of each lobe brownish; corolla lobes 5.5–7 mm long; membranous margin of calyx lobes c. 0.5 mm wide (near base) ..... 11. *L. judithiana*
- 11: Plant and branches slender (diameter of branches 0.7–2 mm [average c. 1.4 mm]); staminal filaments 0.6–0.7 mm long; flowers faintly to mildly aromatic, musk-like, not unpleasant; corolla white; corolla lobes 3–5 mm long; membranous margin of calyx lobes 0.1–0.2 mm wide (near base) ..... 12. *L. exilis*

1. *Logania spermacocea* F. Muell., *Fragm.* 6: 134 (1868); Benth., *Fl. Austral.* 4: 365 (1869); Blackall & Grieve, *How to know Western Australian wildfl.* III: 547 (1965).

LECTOTYPE (here chosen): Western Australia: Champion Bay, [Walcott & Oldfield] s.n. (MEL 501241 — lower left specimen); isolecto MEL 501241 (upper two, lower centre and lower right specimens), MEL 501242.

OTHER SYNTYPES: WESTERN AUSTRALIA: 'by Murchison' [River], *Oldfield* s.n. (MEL 501240); Champion Bay, *Anonymous* [?Oldfield] s.n. (MEL 501244). Probable syntype: 'South of Barrel Well [or Barrel Hill], [Murchison River], *Anonymous* [?Oldfield] 311 (MEL 501243).

Erect, ± compact caespitose subshrub, mostly 15–30(–40) cm high, ?bisexual or functionally monoecious; branches terete, deeply longitudinally furrowed (c. 6 furrows), moderately to densely hairy, frequently hispid; hairs patent to spreading, usually 0.1–0.5 mm long (occasionally to 0.8 mm). Leaves sessile; stipules membranous, 0.3–1 mm long, usually glabrous; lamina narrow, elliptic to obovate or oblong, 6.1–12.8 mm long, 0.9–1.8 mm wide [length to width ratio 5–9.2], sometimes only base of leaves persisting, hence appearing to be reduced to triangular scales 1–2 mm long; margin slightly to strongly revolute; apex often slightly recurved; both surfaces moderately hairy, hairs usually 0.4–0.8 mm long (occasionally to 1.8 mm). Inflorescence terminal, often on short axillary branches, monadic; flowers solitary, occasionally with two branches per leaf axil hence inflorescence appearing 2-flowered or vegetative internodes reduced and flowers clustered into 3–5-flowered groups; pedicels to 2 mm; prophylls 2–5 mm long, moderately to densely hairy, hairs to 1.2 mm long. Calyx (4.5–)6–8.5 mm long; lobes narrowly ovate to narrowly triangular, (4–)5–8.2 mm long, 0.8–1.3 mm wide, longer than corolla tube, reaching to 1/2 way up corolla lobes, occasionally longer than corolla (possibly more common for flowers with reduced anthers and so are effectively female); margin membranous, ciliate (hairs 0.3–1 mm long); apex acute; outer surface moderately to densely hairy (hairs 0.3–1 mm long); inner surface glabrous throughout or hairy distally. Corolla 7–13 mm long (female flowers frequently smaller than male ones), white, 1/2 connate; tube 4–6 mm long, outer surface glabrous, inner surface with scattered hairs (especially on lower half) (hairs 0.1–0.2 mm long); lobes oblong to obovate, 3.5–5 mm long; apex rounded to slightly apiculate, outer surface moderately to sparsely hairy (hairs 0.1–0.2 mm long), inner surface densely papillate/hairy (hairs <0.1 mm long). Stamens inserted in sinus between corolla lobes; filaments 0.6–1.1 mm long, not or only slightly broader at base, glabrous or with occasional minute papillae; anthers 0.6–0.7(–1) mm long (female flowers), 1.2–2.1 mm long (male or bisexual flowers), glabrous. Pistil 4–6 mm long; ovary 1.2–2 mm long, very sparsely glandular-hairy (hairs to 0.3 mm long); style glabrous, 2.2–2.8 mm long; stigma broadly obovoid to capitate (female flowers), 0.4–0.5 mm long, ovoid-oblong to obovoid-oblong (male or bisexual flowers), 0.9–1.2 mm long. Capsule ovoid, 5.5–7.5 mm long, with base of style persisting, hence apex acute, glabrous; seeds not seen. Figure 1m–q.



Marion Westmacott

Figure 1. *Logania biloba* a. flower and prophylls; b. open corolla showing inner surface and stamens; c. pistil; d. open calyx showing outer surface; e. detail of leaves and branchlet. *Logania flaviflora* f. plant showing habit and flowers; g. flower and prophylls; h. open corolla showing inner surface and stamens; i. pistil; j. open calyx showing outer surface; k. detail of branchlet surface; l. detail of leaves and branchlet. *Logania spermacoccea* m. flower and prophylls; n. open corolla showing stamens; o. pistil; p. open calyx showing outer surface; q. detail of leaves and branchlet. (a-e Perry 285; f-l Conn 3301; m-q Conn 3276). Scale bar a, b, d, g, h, j, m, n & p = 5 mm; c, e, i, l, o & q = 2 mm; f = 10 mm; k = 1 mm.

DISTRIBUTION: Endemic to Western Australia (Irwin and Darling)(Map 1).

HABITAT: Commonly associated with heathlands or low shrublands, occasionally associated with low *Banksia* or *Eucalyptus calophylla* woodland, in sandy soil, often overlying laterite or clay colluvium.

AFFINITIES: This species has close affinities to *L. biloba* and *L. flaviflora*. All three species have distinct leaves and more or less terete branches with many longitudinal furrows. It differs from the latter two species by having long (0.1–0.5(–0.8) mm), patent to spreading hairs on the branches, whereas the branches of *L. biloba* and *L. flaviflora* have short hairs (<0.1(–0.2) mm long) that are antrorse to retrorse. The corolla of *L. spermacoccea* is white, whereas it is yellow in the other two species.

NOTES: Male or bisexual flowers tend to have larger anthers and a longer, more oblong stigma than the female flowers; however, viable pollen appears to be produced in both type of flowers. It is possible that what have been referred to here as 'male' flowers may be bisexual, because fruits appear to be occasionally produced on these plants.

CONSERVATION STATUS: Not regarded as endangered.

SELECTED SPECIMENS (61 examined): WESTERN AUSTRALIA: South-West Botanical Province: Irwin: Kalbarri, *D. & B. Bellairs* 1519, 14 Sep 1984 (PERTH 1676814); between Dongara and Northampton, *Blackall* 2673, 19 Sep 1932 (PERTH 1674145); Eradu, *Gardner* 2636, 17 Sep 1931 (PERTH 1674641 & 1675168); Z-Bend Road, Kalbarri National Park, *Huatiuk* 780369, 3 Dec 1978 (PERTH 1675141); near Three Springs, 1.5 miles onto Nebru Road, *Phillips* 1501, 23 Sep 1968 (AD 97216380); Darling (Drummond): 31 miles (59.9 km) NNW of Gingin, *Aplin & Coveny* 3117, 2 Sep 1970 (PERTH 1676229); AMG 50JLL762775 (Yatheroo 1:50 000 Sheet), corner Gillingarra and Dandaragan roads voucher for Dandaragan Remnant Vegetation Survey, *Griffin* 4928, 11 Aug 1988 (PERTH); Horse Breeding Reserve 15018, W of Mount Lesueur, *Huatiuk* 770052, 17 Jun 1977 (PERTH 1674609); Regans Ford, *Perry* 570, 10 Nov 1975 (PERTH 1676725).

## 2. *Logania biloba* Conn, sp. nov.

Fruticulus erectus ad decumbens, plus minusve caespitosus ad 30 cm altus. Ramuli teretes, plus minusve sulcati, sparse ad dense tomentosus; stipulae 0.2–1 mm longae. Folia sessilia; lamina linearis, 4.8–7.3 mm longa, 0.5–0.8 mm lata, margine dense fimbriata, apice leviter recurvo. Inflorescentiae terminales, uniflores; flores perfecti; pedunculus absens; pedicellus 0.5–0.8 mm longus. Calyx 4.5–5.6 mm longus; lobi anguste deltoidei, 4–5.5 mm longi, leviter longiores quam tubus corollae. Corolla 5.6–8.5(–10.7) mm longa, plus minusve flava; tubus 3.4–5.5 mm longus; lobi plus minusve obovati, 2.2–5.2 mm longi. Stamina in sinu inter lobos corollae inserta. Pistillum 3.2–3.7 mm longum, ovario 0.7–0.9 mm alto, stylo 1.3–1.7 mm longo et moderate vel dense piloso, stigmatibus profunde bilobatis. Capsula ovoidea, circa 4 mm longa, diametro circa 3 mm.

TYPE: WESTERN AUSTRALIA: 35 km by road (c. N) from turnoff to Kalbarri on the North West Coastal Highway, *Perry* 285, 25 Sep 1974 (holo: PERTH 1657720 — lower specimen; iso: MEL, NSW, PERTH 1657712, PERTH 1657720 (upper right specimen), PERTH 1657798, PERTH 1657801, PERTH 1657828).

Erect to decumbent, more or less caespitose subshrub to 30 cm high, compact to open; branches terete, deeply to slightly longitudinally furrowed (c. 6 furrows), sparsely to densely hairy; hairs 0.1–0.3 mm long, curved and more or less retrorse (especially on ridges), sometimes hairs restricted to grooves and then antrorse to retrorse. Leaves sessile; stipules often reduced, membranous, 0.2–1 mm long, soon ruptured by enlarging branch, glabrous, apex truncate or often apiculate with 2 or 3 hairs clustered on point; lamina linear, 4.8–7.3 mm long, 0.5–0.8 mm wide [length to width ratio 7.5–10.4] (leaves of short axillary branches with lamina shorter and with margin membra-

nous, often extending to or almost to the apex); margin densely fimbriate (hairs c. 0.2 mm long), membranous basally; apex often slightly recurved; abaxial surface moderately hairy (hairs to 0.3 mm long); adaxial surface glabrous except for a few hairs distally. Inflorescences terminal, on short axillary branches, monadic; flowers bisexual; peduncles absent; pedicels 0.5–0.8 mm long; prophylls linear, 1–1.2 mm long, c. 0.1 mm wide, not persistent, margin fimbriate. Calyx 4.5–5.6 mm long; lobes narrowly triangular, 4–5.5 mm long, 0.7–1.2 mm wide, slighter longer than corolla tube; margin membranous on basal half and usually extending almost to apex (membranous margin c. 0.3 mm wide basally), ciliate (hairs to c. 0.5 mm long, usually longer than hairs of leaf surface); apex subacute; abaxial surface moderately hairy (hairs spreading to antrorse, 0.3–0.6 mm long); adaxial surface glabrous on basal half, sparsely to moderately hairy distally (hairs more or less appressed and antrorse, to c. 0.1 mm long). Corolla 5.6–8.5(–10.7) mm long, bright yellow, lemon-yellow, 1/2–2/3 connate; tube 3.4–5.5 mm long, outer surface glabrous, often papillose or sparsely hairy near mouth (especially on area below sinus between corolla lobes)(hairs to c. 0.1 mm long), inner surface glabrous or sparsely to moderately hairy in basal half (hairs weak, c. 0.3 mm long); lobes more or less obovate, 2.2–5.2 mm long, (1–)1.5–2.5 mm wide, margin papillose to minutely fimbriate (hairs to c. 0.1(–0.2) mm long), apex rounded; outer surface densely papillose (papillae/hairs to c. 0.05 mm long) and with scattered longer hairs near sinus; inner surface densely papillose (as for outer surface). Stamens inserted in sinus between corolla lobes; filaments 0.2–0.6 mm long, slightly or not broader at base, glabrous; anther 1.1–1.6 mm long. Pistil 3.2–3.7 mm long; ovary 0.7–0.9 mm long, sparsely to moderately glandular hairy (hairs to c. 0.1 mm long); style 1.3–1.7 mm long, moderately to densely hairy throughout (hairs spreading to slightly antrorse, crinkled, 0.3–0.5 mm long); stigma 1–1.3 mm long, deeply bilobed (sinus 0.4–0.6 mm long), each lobe flattened-ovoid, strongly divergent distally, with apex of each lobe rounded. Capsule ovoid, c. 4 mm long, c. 3 mm diameter; apex with base of style persistent (c. 0.3 mm long)(old fruits — *Beard* 6734); seeds not known. Figure 1a–e.

DISTRIBUTION: Endemic to Western Australia (Irwin)(Map 5).

HABITAT: Commonly associated with heath communities on sandplain in yellow sand, also occurring in lateritic soils.

AFFINITIES: This species is closely related to *L. flaviflora*; however, it differs from the latter in several features. *Logania biloba* has a short stigma (1–1.3 mm long cf (1.2–)1.6–3.4 mm long in *L. flaviflora*) that is deeply bilobed (sinus 0.4–0.6 mm long cf sinus usually minute or to 0.3 mm long in *L. flaviflora*). *Logania biloba* generally has a shorter corolla than of *L. flaviflora*. The inner surface of the corolla lobes are densely papillose in *L. biloba*, whereas in *L. flaviflora* they are sparsely to densely hairy basally or sometimes the hairs are restricted to a narrow arching band. *Logania biloba* also has close affinities to *L. spermacoceae* (refer to Notes under the latter for details).

CONSERVATION STATUS: Not regarded as endangered.

ETYMOLOGY: The specific epithet refers to the deeply bilobed and strongly divergent stigma lobes characteristic of this species.

SELECTED SPECIMENS (16 examined): WESTERN AUSTRALIA: South-West Botanical Province: Irwin: 10 miles N of Murchison River on NE Coastal Highway, *Beard* 6734, 7 Oct 1973 (PERTH 1685171, 1685228); 8 km E of the Loop Lookout, Kalbarri National Park, *Bellairs* 1519A (PERTH 1688960); 24 miles N of Murchison River, *George* 7889, 6 Sep 1966 (PERTH 1686275); 65 km by road (c. E) of Geraldton on Mullewa–Geraldton Road, *Perry s.n.*, 28 Sep 1980 (PERTH 1685775).

3. *Logania flaviflora* F. Muell., *Victorian Naturalist* 5: 165 (1889); *Bot. Centralbl.* 41: 461 (1890); Blackall & Grieve, *How to know Western Australian wildfl.* III: 548 (1965).



LECTOTYPE (here chosen): WESTERN AUSTRALIA: 'Sources of Swan River', *Merrall s.n.* (refer Notes below), *anno* 1888 (MEL 501227 – lower right specimen); isolecto: MEL 501227 (upper and left specimen).

OTHER SYNTYPE: *s. loc.* [Swan River], *Drummond 651* (MEL 501226).

Erect to decumbent, caespitose subshrub to 25 cm high, sometimes open and entangled with other shrubs (to 50 cm high), to 30 cm diameter when decumbent; branches terete, deeply to slightly longitudinally furrowed (c. 6 furrows), sparsely to densely minutely hairy, occasionally glabrous; hairs <0.1(–0.2) mm long, curved and more or less retrorse (especially on ridges), sometimes hairs restricted to grooves and then antrorse to retrorse. Leaves sessile; stipules usually not or only partially visible (covered by leaf bases), membranous, 0.4–1 mm long, glabrous (often appearing hairy because more or less enclosed by hairy leaf bases), apex truncate or apiculate with 2 or 3 hairs clustered on point; lamina linear to narrowly ovate or narrowly triangular, (3–)5–10(–15) mm long, 0.5–1(–1.5) mm wide [length to width ratio (3.7–)6–19]; margin densely fimbriate (hairs to 0.5 mm long), membranous basally; apex frequently slightly to strongly recurved; both surfaces sparsely to moderately hairy (hairs to 0.3 mm long), occasionally glabrous except for margin. Inflorescences terminal, usually on short axillary branches, monadic to triadic, usually reduced by flower abortion, sometimes reduced metabotryoidal, 1 or 2(–4)-flowered; flowers bisexual; peduncles absent; pedicels 0.5–1 mm long; prophylls almost linear to filiform, 1.5–2 mm long, to 0.3 mm wide, not persistent or reduced (hence absent)(see note below). Calyx 4–9.5 mm long; lobes narrowly triangular to almost linear, 4.2–9.2 mm long, 0.7–1.2 mm wide, about as long as corolla tube or to 1/2 way up corolla lobes; margin membranous on basal half (membranous margin 0.2–0.3 mm wide basally), fimbriate (hairs to c. 0.5 mm long, often tending to be longer than hairs of leaf surface); apex subacute, slightly recurved; abaxial surface moderately hairy (hairs spreading, often tending to be antrorse or retrorse, 0.3–0.6 mm long); adaxial surface glabrous at base, sparsely to moderately hairy medially (from just above base) and distally (hairs more or less appressed and antrorse, c. 0.3 mm long). Corolla (8–)10–16 mm long, bright to pale yellow, sometimes sufficiently pale to appear cream-coloured to white, 1/3–1/2(–2/3) connate; tube (4–)6–6.5 mm long, outer surface glabrous basally, sparsely and minutely hairy distally (hairs c. 0.05 mm long), or glabrous throughout, inner surface glabrous or sparsely hairy (hairs weak, c. 0.3 mm long); lobes obovate to somewhat ovate, (4–)6–10 mm long, 3–4.8 mm wide, margin papillose to minutely fimbriate, apex rounded, sometimes apiculate; outer surface densely papillose and with scattered longer hairs near sinus; inner surface sparsely to moderately hairy on basal 1–2 mm of lobes, sometimes hairs restricted to a narrow arching band at base (hairs 0.1–0.3 mm long), occasionally densely papillose throughout. Stamens inserted in sinus between corolla lobes; filaments 0.7–1 mm long, slightly broader at base, glabrous; anther 1–2.6 mm long. Pistil 3–5.6 mm long; ovary 0.5–0.7 mm long, glabrous or sparsely hairy distally; style 1–1.5 mm long, glabrous or sparsely to moderately hairy on basal 1/2 (hairs antrorse, c. 0.2 mm long); stigma flattened-ovoid, ovoid-cylindrical to ellipsoid-cylindrical, (1.2–)1.6–3.4 mm long, apex often minutely notched (sinus to 0.3 mm long), occasionally deeply lobed with sinus to 0.5(–3) mm long, lobes never divergent distally. Capsule ovoid, 4–5 mm long, 2–3 mm wide (based on old fruits — *Keighery 1084, Kenneally 7706, Perry 463*); seeds ellipsoid-cylindrical, 2–2.1 mm long, c. 0.6 mm wide, c. 0.6 mm thick, papillose (based on immature fruit — *Dodd 86*). Figure 1f–l.

DISTRIBUTION: Endemic to Western Australia (Coolgardie, Irwin, Darling–Drummond, Avon, Roe, Eyre)(Map 2).

HABITAT: Common in low open heath and shrubland communities, less commonly in low woodlands or grassland communities. Occurs in white sandy soils, often associated with white to brown lateritic soils.

**AFFINITIES:** This species is closely related to *L. biloba* (refer to notes under the latter for a discussion of the similarities and differences).

**NOTES:** One of the herbarium labels on the type material has the collector incorrectly spelt as 'Merrell', whereas the other (and the protologue) has it spelt as 'Merrall'. Edwin Merrill (?1844–1913) was a gold prospector (Willis *et al.* 1986).

The almost linear to filiform organs that are occasionally observed on the pedicel are here assumed to be prophylls. These structures do not persist and appear to be completely absent in most inflorescences.

The corolla varies from bright yellow to pale yellow, and even to almost white. *Allan 128*, *George 7343*, *Phillips s.n.*, (30 Oct 1962) and *Strid 21087* record the flowers as cream-coloured, whereas *Cranfield 4578*, *Phillips s.n.* (29 Oct 1962) and *Wittwer W 900* observed that the flowers are white. In all of these collections, with the exception of *George 7343*, the dried flowers are yellow, therefore under certain conditions the yellow coloration is apparently not evident. *Perry 440* records the corolla as yellow in bud, but white in the open flower. The dried flowers of this collection are pale yellow.

The stigma of this species varies from flattened-ovoid, ovoid-cylindrical to ellipsoid-cylindrical. The apex of the stigma is usually entire to minutely notched; however, occasionally it is more or less bilobed. In the Wongan Hills district two collections (*viz.* *Kenneally 7695* & *7706*) have deeply lobed stigmas, whereas *Parker & Poli s.n.* only has shortly lobed to notched stigmas. Although bilobed stigmas are characteristic of *L. biloba*, the stigmas of the above collections are more typical of *L. flaviflora*; i.e. they are much longer and narrower than found typically in *L. biloba*, the stigma lobes are not strongly divergent (typical of *L. biloba*) and the style is not hairy throughout (typical of *L. biloba*). Likewise, *Griminez for Garduer 796* (from New Norcia) has a bilobed stigma, but it is regarded as best classified with this species rather than *L. biloba*. Two collections from the Pindar district (*viz.* *Garduer 7769* and *Lullfitz L. 1178*) appear to have pistils similar to *L. biloba*, but in all other respects are more typical of *L. flaviflora*. The classification of these latter two is uncertain.

Fruiting material of this species is only known from three collections (*viz.* *Dodd 86*, *Keighery 1084* and *Kenneally 7706*). The first collection has immature fruits (corolla still attached), whereas the latter two only have old fruits which have discarded their seeds.

**CONSERVATION STATUS:** Not regarded as endangered.

**SELECTED SPECIMENS** (123 examined): WESTERN AUSTRALIA: Eremaean Botanical Province: Coolgardie: Dulyalbin Rock, S of Moorine Rock, *Dodd 86*, 25 Jan 1984 (PERTH 1664107); 88 km SW of Coolgardie, *Hnatiuk 800191*, 18 Oct 1980 (PERTH 1689436); 12 km N of Mt Holland, *Keighery 1084*, 11 Oct 1977 (PERTH 1664042); 70 km by road (c. E) from Southern Cross on Great Eastern Highway, *Perry 1144*, 9 Oct 1980 (PERTH 1657755). South-West Botanical Province: Irwin: E of Badgingarra, c. 175 km N of Perth, *Ashby 1339*, 14 Nov 1964 (AD 96535105); Kalbarri National Park, along road between the town of Kalbarri and North West Coastal Highway, near eastern border of Park, *Strid 20829*, 10 Oct 1982 (PERTH 1656651); Avon: 28.5 km ENE of Highbury, *Cranfield 4578*, 22 Oct 1983 (PERTH 1656716); Conway's property 'Dunmoor' on the E edge of the Wongan Hills, *Kenneally 7695*, 4 Oct 1981 (PERTH 1198653); 5 km NW of the township of Wongan Hills on the Wongan Hills–Piawaning Road, *Kenneally 7706*, 5 Oct 1981 (PERTH 1198645); 6.5 km by road (c. E) of the Humps, *Perry 463*, 14 Oct 1975 (PERTH 1657240); Darling (Drummond): Midland Junction, Perth, *Fitzgerald s.n.*, Nov 1902 (PERTH 1658751); AMG 50JLL980848 (Capitella 1:50 000 sheet), *Griffin 5378*, 1 Oct 1988 (PERTH); Roe: c. 6 miles E of Newdegate, *George 7343*, 6 Nov 1965 (PERTH 1664646); 47 km by road (c. W) from Lake King on Lake Grace-Lake King Road, *Perry 440*, 11 Oct 1975 (PERTH 1664158); 12 miles E of Newdegate, *Phillips s.n.*, 30 Oct 1962 (BRI 105732); Eyre: 25 km SW of Ravensthorpe (Newdegate 1:250,000 sheet), *Newbey 6228*, 17 Oct 1979 (PERTH 1657704).

4. *Logania callosa* F. Muell., *Fragm.* 6: 134 (1868); Benth., *Fl. Austral.* 4: 365 (1869); Blackall & Grieve, *How to know Western Australian wildfl.* III: 547 (1965).

LECTOTYPE (here chosen): WESTERN AUSTRALIA: 'W.A.' ['In Australia occidentali' (protologue)], *Drummond s.n.* (MEL 866)(see Typification below).

Prostrate or slender, suberect herb 15–20 cm high, growing from a slender woody rootstock; branches subterete, simple or sparingly branched, moderately hairy, rarely glabrous; hairs 0.1–0.2 mm long, retrorse. Leaves sessile, crowded along distal end of branches, such that internodes usually not visible; interpetiolar stipule herbaceous, to 0.5 mm long, glabrous; lamina narrowly elliptic to elliptic, 6.5–11 mm long, 1.5–2.8 mm wide [length to width ratio 2.3–7]; margin revolute so that leaves appear narrow; apex obtuse, appearing slightly apiculate because of revolute margin; sparsely to moderately hairy, particularly on or near margin and towards base of midrib of abaxial surface; hairs 0.3–0.5 mm long, spreading to retrorse. Inflorescence terminal on main branches or on short axillary branches; flowers solitary, rarely 3-flowered, bisexual, sessile; pedicels <0.3 mm long, glabrous; prophylls c. 4.5 mm long, similar to calyx lobes. Calyx 7.5–8.5 mm long; lobes narrowly triangular, longer than the corolla tube; margin membranous, ciliate (hairs c. 0.5 mm long); apex acute; outer surface moderately hairy (hairs c. 0.5 mm long); inner surface glabrous, except near apex moderately hairy. Corolla 15–22 mm long, dark yellow in bud, paler to almost white when open, c. 1/2 connate (tube usually slightly shorter than lobes); lobes obovate, apex rounded; outer surface glabrous, except for a few hairs near margin towards base of lobes (hairs c. 0.3 mm long); inner surface sparsely hairy in tube (hairs 0.5–0.6 mm long), densely covered with crinkly hairs in a more or less narrow arching band from base of lobes (near margin) to c. 3 mm from base of lobes (medially), sparsely covered with minute hairs in area enclosed by band of hairs, the remaining inner surface of lobes minutely papillose. Stamens inserted in sinus between corolla lobes; filaments c. 1 mm long, glabrous; anthers 2–2.2 mm long, glabrous, basal lobes free for c. 0.8 mm. Pistil c. 5.5 mm long; ovary c. 1 mm long, sparsely hairy; style c. 1.5 mm long, sparsely hairy; stigma cylindrical, 3–3.5 mm long. Capsule ovoid, c. 5.5 mm long; coarsely hairy; seeds not seen. Figure 2g–l.

DISTRIBUTION: Endemic to Western Australia (Roe & Eyre)(Map 1).

HABITAT: Occurs in open heath communities, in deep white sandy soils.

AFFINITIES: The affinities of this species are not certain, but it appears to be most closely related to *L. campanulata*. Both species have crinkly hairs near the base of the inner surface of the corolla lobes; however, in *L. callosa* these hairs are arranged in a narrow arching band, whereas these hairs are not arranged in a band in *L. campanulata*. In *L. campanulata* the outer surface of the corolla is sparsely to moderately hairy, whereas it is glabrous in *L. callosa*, except for a few hairs on the margin at the base of the lobes. The inflorescences of *L. callosa* are usually 1-flowered, rarely 3-flowered. The inflorescences are typically 2–15-flowered in *L. campanulata*, rarely as few as 1-flowered. *Logania callosa* is usually a smaller plant than *L. campanulata*. Both species have the leaves crowded along the distal end of branches, but the internodes of *L. callosa* are usually not visible, whereas the internodes are usually visible in *L. campanulata*.

TYPIFICATION: Since Mueller did not apply a type concept, it was decided to lectotypify, even though it appears that only one collection was examined by him while preparing the protologue.

CONSERVATION STATUS: Unknown.

SELECTED SPECIMENS (14 EXAMINED): WESTERN AUSTRALIA: South-West Botanical Province: Roe: Lort River, W of Grass Patch, *Beard 5413*, 1 Nov 1967 (PERTH 1650823); Private property off Taylor Road, c. 55 km S of Newdegate — Lake King Road, *E. George s.n.*, 31 Oct 1989 (PERTH); 16 km

by road (c. W) from Lake King on Lake Grace-Lake King Road, *Perry* 433-438, 12 Oct 1975 (PERTH 1650882, 1650874, 1650890, 1650416, 1650394 & 1650904, respectively); Eyre: 54 miles E of Ravensthorpe, *Aplin* 2660, 27 Oct 1963 (PERTH 1650858); Dr J.K. Skoss' farm, Gibson's Soak, *Beard* 2331, 5 Nov 1962 (PERTH 1650424); below N end of Whoogarup Range, *George* 7214, 1 Nov 1965 (PERTH 1650866); 13 miles N of Esperance-Ravensthorpe turnoff, *Royce* 8838, 23 Oct 1969 (PERTH 1650408).

**5. *Logania campanulata*** R. Br., *Prodr.* 456 (1810); F. Muell., *Fragm.* 6: 133 (1868); Benth., *Fl. austral.* 4: 365 (1869); Blackall & Grieve, *How to know Western Australian wildfl.* III: 548 (1965); Rye, *Fl. Perth region* 1: 519 (1987).

LECTOTYPE (here chosen): WESTERN AUSTRALIA: 'King George III's Sound', *R. Brown s.n.* [Bennett 2912], [-?19] Dec 1801 (BM — left specimen); isolecto.: (BM — central and right specimens).

Erect herb to 60 cm high, growing from a woody rootstock; branches terete, simple or sparingly branched, sparsely to moderately hairy, rarely glabrous; hairs more or less patent, straight or curved (then apex antrorse or retrorse), simple or septate, 0.1-0.4 mm long. Leaves sessile, either crowded along branches or well spaced, surface of internodes usually visible; interpetiolar stipule herbaceous, c. 5 mm long, glabrous; lamina narrowly ovate, 15-32 mm long, 1.9-3.2(-7) mm wide [length to width ratio (4)-7.9-10], becoming smaller distally; margin slightly revolute; apex obtuse to acute; both surfaces sparsely hairy, especially along margin and midrib of abaxial surface. Inflorescence terminal on main branches or occasionally on short axillary branches; inflorescence monadic or 2-15-flowered in loose broad, variously reduced dichasia, bisexual; pedicel 2-14(-16) mm long, moderately to densely hairy, with patent hairs 0.2-0.5 mm long; prophylls 2.5-3.5 mm long. Calyx 5.5-8 mm long; lobes narrowly triangular to narrowly ovate, shorter than the corolla tube (in open flower), rarely slightly longer; margin membranous, ciliate (hairs c. 0.3 mm long); apex acute; outer surface moderately hairy (hairs c. 0.3 mm long); inner surface glabrous basally, distally sparsely to moderately hairy. Corolla 12-18(-22) mm long, white, c. 1/2 connate (tube usually slightly shorter than lobes); lobes ovate to elliptic or oblong, apex obtuse; outer surface sparsely to moderately hairy (hairs 0.1-0.2 mm long); inner surface moderately hairy, with similar hairs to those of outer surface, but also with crinkly hairs near base of lobes. Stamens inserted in sinus between corolla lobes; filaments 0.9-1.6 mm long, sparsely to moderately hairy; anthers 2.9-4.7 mm long, glabrous. Pistil 7.5-10.5 mm long; ovary 1.1-1.7 mm long, very sparsely hairy and with short glandular hairs; style hairy, 2-3 mm long; stigma ovoid-oblong to cylindrical, 3.2-6.5 mm long. Capsule ovoid, 6.2-9 mm long, 5-6 mm diameter, minutely and sparsely pubescent; stigma and style persisting for some time; seeds yellow, oblong, c. 1.3 x 0.67 mm, minutely papillose. Figure 2a-f.

DISTRIBUTION: Endemic to Western Australia (Irwin, Avon, Darling, Roe, Eyre)(Map 3).

HABITAT: Occurs in low closed or open heath communities, or in Jarrah forests or woodlands. The associated species of the Jarrah woodland communities commonly consist of *Bauksia coccinea*, *Hakea cucullata* and a low heath understorey. The soils are usually sandy, but generally lateritic, for example, as grey sand over a lateritic duricrust, usually with a clay layer near the surface. It also occurs in coarse grey sandy soils when overlying granite, sometimes occurring in loamy soils, rarely growing in soils associated with limestone.

AFFINITIES: The affinities of this species appear to be with *L. callosa* (refer to this species for a discussion of similarities and differences).

NOTES: The corolla tube elongates as the flower matures, therefore the calyx lobes are more or less as long as the corolla tube initially, but usually end up being much shorter.



**Figure 2.** *Logania campanulata* a. plant showing habit and flowers; b. flower and prophylls; c. open corolla showing inner surface and stamens; d. open calyx showing outer surface; e. pistil; f. detail of leaves and branchlet. *Logania callosa* g. plant showing habit and flowers; h. flower and prophylls; i. open corolla showing inner surface and stamens; j. open calyx showing outer surface; k. pistil; l. detail of leaves and branchlet. (a-f Keighery 8802; g-l Perry 436). Scale bar: a & g = 10 mm, b-d, f, h-j, l = 5 mm; e & k = 2 mm.

*Trudgen 1730* is an unusually broad-leaved specimen with leaves 28 mm long and 7 mm wide (length to width ratio 4.3); however, in all other respects this collection is typical of *L. campanulata*. Likewise, *Royce 4968* has broad leaves (30 mm long, 6.5 mm wide; length to width ratio 4.6). Both of these collections are from the Watheroo area. The *Royce 4968* collection is also unusual in that the calyx is longer than the corolla tube and it has some whorled leaves. *Aplin 1309* (also from Watheroo) has slightly larger leaves than normal, but not significantly so.

The corolla appears to be consistently white; however, *Hnatiuk 761401* record the corolla as blue. This is either in error or an extremely unusual colour form.

SELECTED SPECIMENS (63 examined): WESTERN AUSTRALIA: South-West Botanical Province: Irwin: W of Watheroo, *Aplin 1309*, 30 Nov 1961 (AD 97201103, PERTH 1653024); 126 mile post on Eneabba road (c. 75 km S of Eneabba on Brand Highway), *Demarz 759*, 19 Nov 1968 (PERTH 1653598); Coomallo Creek, shrub, *Hnatiuk 761401*, 15 Dec 1976 (PERTH 1654535); Dinner Hill, W of Watheroo, *Royce 4968*, 4 Nov 1954 (PERTH 1654063); Avon: Midland Junction, *Andrews s.n.*, Dec 1902 (PERTH 1654101); Darling (Drummond): c. 14 km S of junction of Brand Highway and Badgingarra Road, *Hnatiuk 780343*, 14 Nov 1978 (PERTH 1653016); Watheroo West Road, 8.3 km W of Western boundary of Watheroo National Park, *Trudgen 1730*, 6 Oct 1976 (PERTH 1652478); Darling (Dale): by Albany Highway, SE of Armadale, by turnoff to Jarrahdale (Scenic Drive), *Strid 21640*, 3 Dec 1982 (PERTH 1652001); Darling (Menzies): 8 miles from Mt Barker on road to Denmark, *Kenneally s.n.*, 4 Feb 1971 (PERTH 1652028); just E of Mt Manypeaks, Stirling District, *Whibley 5201*, 9 Nov 1974 (PERTH 1653539); Darling (Warren): West Cape Howe, 30 km W of Albany, *Keighery 9757*, 1 Nov 1986 (PERTH 1653555); Roe: Condingup, *Dauet 10*, 23 Jan 1967 (PERTH 1652427); Eyre: near Mt Baring, 88 miles E of Esperance, *Aplin 2602*, 25 Oct 1963 (PERTH 1652516); Cape Arid National Park, E of Esperance, *Royce 9883*, 29 Nov 1971 (PERTH 1654020).

6. *Logania pusilla* R. Br., *Prodr.* 456 (1810); Bauer, in Endlicher, *Icon. Gen. Plants* t. 58 (1838); DC., *Prodr.* 26 (1845); White, in Bailey, *Compr. Cat. Queensland Plants* f. 314 (1913); Willis, *Handbk plants in Victoria* II: 520 (1972[1973]); Beadle, *Students Fl. NE New South Wales* 5: 696 (1984); Conn, *Fl. New South Wales* 3: 478 (1992).

LECTOTYPE (here chosen): NEW SOUTH WALES: Port Jackson, *R. Brown s.n. [Bennett 2911]*, (BM — lower left specimen); isolecto: (BM lower centre and right specimens, all except for left specimen; MEL 501234).

Herb or procumbent undershrub, 5–10 cm high; glabrous; branches with two lateral longitudinal ridges. Leaves with petiole 1–3 mm; stipules triangular, 0.8–1 mm high and wide, often reduced to an interpetiolar band c. 0.3 mm wide; lamina narrowly elliptic to narrowly obovate, or oblong, 6–12(–14) mm long, 3–6(–8) mm wide [length to width ratio 1.7–2], flat; base cuneate to attenuate, somewhat decurrent; margin slightly revolute; apex obtuse to acute. Inflorescence terminal, appearing axillary, monadic (refer Notes below); pedicel (including anthopodium) to 1.5 mm long; pherophylls and prophylls absent; flowers bisexual. Calyx (3–)4.5–5(–6) mm long; lobes narrowly ovate, (2.8–)4–5(–5.5) mm long, 0.7–1 mm wide, longer than corolla tube, reaching to at least 1/2 way up corolla lobes; margin ciliate; apex tapering to subulate; outer and inner surface glabrous, although usually with a few minute papillae on midrib of outer surface. Corolla 4–8 mm long, white; tube 3–4.8 mm long; lobes ovate to elliptic, 1.7–2 mm long, 1.2 mm wide; apex obtuse; outer surface glabrous; inner surface sparsely hairy throughout tube and on basal half of lobes; hairs c. 0.2 mm long, spreading, crinkly. Stamens inserted in mouth; filaments 0.4–0.5 mm long, glabrous or with an occasional hair; anthers 0.8 mm long. Pistil 4.5–7 mm long, glabrous; ovary 1.2–1.3 mm long; style 2.3–2.5 mm long; stigma ellipsoid to cylindrical, 1–1.2 mm long. Capsule ovoid, 3.7–5 mm long, with at least base of style persisting, hence apex apiculate to acute, glabrous; seeds dull yellow, slightly flattened ellipsoid, c. 2 mm long, 0.5–1 mm wide, minutely papillose. Figure 3m–r.

**DISTRIBUTION:** Eastern Australia: southern Queensland, near coastal New South Wales and eastern Victoria. This is the only species of this section that is restricted to Eastern Australia (Map 5).

**HABITAT:** Usually an infrequent species of open sclerophyll forest or woodland communities, commonly with *Encalyptus gummifera*, *E. piperita*, *Angophora costata*, *A. intermedia* and *Allocasuarina littoralis*, occasionally occurs in low shrubland or heathland communities. Occurs in sandy soils of the Hawkesbury sandstone, also in loamy or clayey soils.

**AFFINITIES:** The affinities of this species are not certain, but it appears to be most closely related to *L. serpyllifolia*. It is readily distinguished from the latter species by the following features. *Logania pusilla* is glabrous, whereas *L. serpyllifolia* is usually sparsely to moderately hairy (rarely glabrous); the leaves are petiolate with petiole 1–3 mm long (in *L. serpyllifolia* subsp. *serpyllifolia* the leaves are subsessile to shortly petiolate with petiole 0.1–0.8 mm long, in subsp. *angustifolia* (0.2–)0.5–2.5 mm long); the leaf lamina is narrowly elliptic to narrowly obovate or oblong, whereas the lamina of *L. serpyllifolia* is variously ovate; the corolla tube is 3–4.8 mm long, whereas it is only 1.6–2.9 mm long in *L. serpyllifolia*; the ovary and style is glabrous in *L. pusilla*, but very sparsely to moderately glandular hairy in *L. serpyllifolia*.

**NOTES:** Although the anthotelic inflorescence appears axillary, it is terminal with one or occasionally both axillary vegetative axes developing. The inflorescence is highly derived, having a reduced structure with both pherophylls and prophylls absent.

The capsules are 3.7–5 mm long, not '5–9 mm long' as cited in Conn (1992b, p. 478).

**CONSERVATION STATUS:** Not regarded as endangered.

**VERNACULAR NAME:** Tiny logania (Willis 1972).

**SELECTED SPECIMENS (37 examined):** QUEENSLAND: Leichhardt: Road to Stony Creek, NE area of Blackdown Tableland, *Cribb s.n.*, 3 Sep 1974 (BRI 73998); Moreton: Brisbane River, *Bailey s.n.*, (BRI 54426); Sunnybank, *O'Brien s.n.*, – Sep 1909 (BRI 54427, NSW 243512).

NEW SOUTH WALES: North Coast: Woolgoolga Headland, *Floyd s.n.*, 29 Dec 1991 (NSW 252134); about 1 mile (1.6 km) S of Evans Head, Bundjalung National Park, *Coveny 5117*, 2 Sep 1973 (NSW 243483); Central Coast: Hillsview, 2 km E of Casula, *Coveny & Dixon s.n.*, — May 1978 (NSW 243498); Terrey Hills, near junction of Mona Vale Road with road to Forestville, on N side of the latter road, *Evans s.n.*, 16 Oct 1965 (NSW 89234); Track at end of Lt. Bowen Drive, Bowen Mountain, *James 1089*, 3 Mar 1989 (NSW 239616); South Coast: outskirts of Huskisson, *Coveny 11003 & James*, 30 Sep 1981 (NSW 243506); Germans Creek, Yambulla State Forest, *Newman 13*, 23 Dec 1976 (NSW 243504); Southern Tablelands: Queanbeyan, *Constable s.n.*, 14 Dec 1950 (NSW 18816).

VICTORIA: East Gippsland: near Davis Creek, Mallacoota, *Melville 2767 & Wakefield*, 9 Jan 1953 (NSW 243513).

7. *Logania serpyllifolia* R. Br., *Prodr.*, 456 (1810); DC., *Prodr.*, 9: 26 (1845); F. Muell., *Fragm.* 6: 133 (1868); Benth., *Fl. austral.* 4: 366 (1869); Blackall & Grieve, *How to Know Western Australian wildfl.* III: 548 (1965); Rye, *Fl. Perth region* 1: 519 (1987).

**LECTOTYPE** (here chosen): WESTERN AUSTRALIA: 'King George's III Sound', *Brown s.n.*, anno 1802–5 (BM); isolecto: MEL 501235.

Other specimens cited in Mueller (1868): *Maxwell, Drummond 221, 116, 145*

*Logania serpyllifolia* R. Br. var. *angustifolia* Benth., *Fl. austral.*, 4: 366 (1869).

**SYNTYPES:** WESTERN AUSTRALIA: *s. loc.*, *Drummond 146 (n.v.)*; *s. loc.*, *Drummond 221* (MEL 501237, MEL 501238); *s. loc.* 'W.A.', *Preiss 1242* (MEL 401236)(type of *L. hyssopoides*

Nees, see below); 'C. [Cape] Leschenault [Leschenault Estuary], [North of] Bunbury', *Oldfield* 329 (MEL 501239).

*Logania hyssopoides* Nees, in Lehm., *Pl. Preiss.*, 1: 368 (1845).

TYPE: WESTERN AUSTRALIA: ['Ad sinum regis Georgii III' (protologue)], *Preiss* 1242, [Oct 1840 (protologue)] (MEL 401236).

*L. hispidula* Nees, *l.c.*

TYPE: WESTERN AUSTRALIA: ['prope montem Wulijenup' (protologue)], *Preiss* 1243, [Oct 1840 (protologue)] (*u.v.*).

*L. centaurium* Nees, *ibid.* 2: 240.

TYPE: WESTERN AUSTRALIA: ['districtus Sussex' (protologue)], *Preiss* 2428, [19 Dec 1839 (protologue)] (*u.v.*).

Small erect or ascending to spreading, compact or diffuse subshrub, 5–20 cm high; branches more or less square (in section), angles ridged to narrowly winged (wings c. 0.1 mm wide), sparsely to moderately hairy (to 30 hairs per mm<sup>2</sup>), more or less hispid, hairs more common or restricted to ridges, wings and/or nodes, rarely glabrous; hairs 0.1–0.3 mm long, more or less patent. Leaves sessile to shortly petiolate; petiole 0.1–0.8 mm long, sparsely to moderately hairy (hairs 0.1–0.2 mm long), rarely glabrous; stipule oblong to triangular, 0.4–2.5 mm long, with erect hairs on margin and apex (hairs 0.1–0.3 mm long), apex variable, subacute to blunt, occasionally irregular or lobed; lamina very broadly ovate to ovate, 3.2–10 mm long, 2.5–5.2 mm wide [length to width ratio 1–2.6], sparsely to moderately hairy, indumentum often restricted to margin and midrib of abaxial surface, rarely glabrous; hairs more or less patent, 0.1–0.2 mm long; base rounded to shortly attenuate; margin recurved; apex more or less obtuse to subacute. Inflorescence terminal, always reduced, dichasial to triadic, or sometimes reduced dichasia arranged to form a dichasial confluence, typically with 1 or both of the lateral flowers of the triads (in the dichasium) aborted, or even with 1 of the triads aborted, often with prophylls aborted, 2–14-flowered; peduncle absent or to 15 mm long, glabrous or hairy (hairs to 0.2 mm long); flowers bisexual, odour not recorded; pedicel 0.5–1.2 mm long, glabrous or hairy (hairs to 0.3 mm long); prophylls linear, 3–4.5 mm long, 0.2–0.3 mm wide, margin ciliate (hairs <0.3 mm long) or hairs absent, apex long-attenuate. Calyx 3.5–5 mm long; outer surface moderately to densely hairy, particularly medially and on margin; inner surface glabrous; lobes narrowly ovate, 3.4–4.5 mm long, 0.7–1.1 mm wide, margin often narrowly membranous (to c. 0.1 mm wide), apex long-attenuate. Corolla white, (4–)4.5–8.5 mm long; outer surface glabrous, densely papillose (papillae <0.05 mm long); tube 1.6–2.9 mm long, c. 1/2(–2/3) as long as the lobes, internally unthickened, glabrous at base (basal c. 0.7 mm), moderately hairy distally (hairs c. 0.3 mm long); lobes more or less obovate, 3–5.5 mm long, 1.5–2.1 mm wide, inner surface densely hairy basally (on basal 1–1.4 mm)(hairs long, 0.6–0.8 mm long, shorter hairs also present), distally sparsely covered with long hairs and moderately covered with minute hairs (hairs c. 0.1 mm long) and papillae (papillae c. 0.03 mm long), margin papillate, apex rounded (often with a triangular acumen 0.1–0.2 mm long) to subacute. Stamens inserted in sinus between corolla lobes, exerted; filaments 0.6–1.5 mm long, filiform, not broadened at base, glabrous except for a few hairs at base; anthers 0.9–1 mm long. Pistil 3–4 mm long; ovary c. 0.7 mm long, very sparsely to moderately glandular hairy (glands 0.2–0.3 mm long); style 1.2–2 mm long; stigma ellipsoid, 0.6–0.8 mm diameter. Capsule ovoid, 2.5–4.5 mm long, c. 2 mm diameter, very sparsely hairy, base of style persistent (0.2–0.4 mm long), sometimes entire style and stigma persistent; seeds c. 3 per locule, oblong, 1.4–1.5 mm long, c. 0.5 mm wide, c. 0.4 mm thick, densely papillose.



DISTRIBUTION: Endemic to Western Australia (Avon, Darling, Eyre).

NOTES: The affinities of this species appear to be with *L. pusilla* of eastern Australia (refer to the latter for a discussion of the differences between these two species).

The inflorescences are extremely variable in this species; however, they appear to be consistently reduced due to flower or axes abortion. The inflorescence sometimes appears 1-sided as a result of the abortion of flowers or entire axes. This is particularly evident in reduced dichasial confluences (e.g. *Helms s.n.*, PERTH 1672517 = *L. serpyllifolia* subsp. *serpyllifolia*). The prophylls are frequently absent.

### Key to subspecies

- 1 Leaves with lamina very broadly ovate to ovate, 3.2–10 mm long, length to width ratio 1–2.6, base of lamina rounded to shortly attenuate; petiole 0.1–0.8 mm long ..... subsp. *serpyllifolia*
- 1: Leaves with lamina narrowly ovate, or sometimes narrowly elliptic, (5.5–)8–16(–22) mm long, length to width ratio (2.5–)3–6, base of lamina attenuate; petiole (0.2–)0.5–2.5 mm long ..... subsp. *angustifolia*

#### *Logania serpyllifolia* R. Br. subsp. *serpyllifolia*

*Logania hispidula* Nees, in Lehm., *Pl. Preiss.*, 1: 368 (1845).

TYPE: WESTERN AUSTRALIA: [‘prope montem Wulijenu’ (protologue)], *Preiss 1243*, [Oct 1840 (protologue)] (*u.v.*).

Subshrub, 5–20 cm high. Leaves with petiole 0.1–0.8 mm long; lamina very broadly ovate to ovate, 3.2–10 mm long, (2.2–)2.5–5.2 mm wide [length to width ratio 1–2.6]; base rounded to shortly attenuate. Inflorescence with peduncle absent or to 15 mm long. Figure 3a–f.

DISTRIBUTION: Western Australia (Avon, Darling, Eyre)(Map 4).

HABITAT: This subspecies tends to occur in wetter areas than subsp. *angustifolia*, frequently in *Eucalyptus diversicolor* (Karri) dominated low woodlands and open forests, on heavy loam-clay to grey sandy loam soils overlying granites. Also occurs in coastal heaths. The wetter soils, particularly those near swamps, are frequently black peaty sands.

NOTES: Refer to ‘Notes’ under subsp. *angustifolia* for a comparison between the two subspecies.

One collection (*Bennett 2832*) is unusual in that it has glabrous branches and leaves, glabrous calyx and papillose corolla lobes. *Logania serpyllifolia* rarely has glabrous branches or glabrous leaves, usually has a hairy calyx and the inner surface of corolla lobes are usually densely hairy near base.

CONSERVATION STATUS: Not regarded as endangered.

SELECTED SPECIMENS (45 examined): WESTERN AUSTRALIA: South-West Botanical Province: Avon: just N of Stirling Range, c. 25 km E of Cranbrook, *Wilson 3313*, 18 Sep 1964 (AD 96526206, PERTH 1673564); Darling (Menzies): 26 miles [from] Augusta [on road to] Nannup, *Bennett 2832*, 19 Dec 1968 (PERTH 1670425); 16 km NNE of Albany off the Chester Pass Road, *Chinmook 3216*, 5 Oct 1976 (PERTH 1691015); Gull Rock Lake, Albany, *Cranfield 4967*, 30 Sep 1984 (PERTH 1672487); Albany, *Helms s.n.*, Dec 1898 (PERTH 1672517); 13 km by road from Hassal Highway on road to Cheyne Beach, *Perry 604*, 30 Sep 1976 (PERTH 1673068); Darling (Warren): Torbay Hill, W of Albany, *Perry 269*, 14 Sep 1974 (PERTH 1670921); Northcliffe-Walpole road, *Wittwer*

W577, 8 Jan 1967 (PERTH 1670492); Eyre: Summits of Middle Mt Barren Range, *Gardner & Blackall s.n.*, — Sep 1925 (PERTH 1673092); Lucky Bay, Cape Le Grand National Park, *Keighery 656*, 10 Oct 1974 (PERTH 1674064).

***Logania serpyllifolia* R. Br. subsp. *angustifolia* (Benth.) Conn, stat. nov.**

BASIONYM: *Logania serpyllifolia* R. Br. var. *angustifolia* Benth., *Fl. austral.*, 4: 366 (1869).

Lectotype (here chosen): [Western Australia]: 'C. [Cape] Leschenault' [Leschenault Estuary], [North of] Bunbury, *Oldfield 329* (MEL 501239).

OTHER SYNTYPES: WESTERN AUSTRALIA: *s. loc.*, *Drummond 146 (n.v.)*; *s. loc.*, *Drummond 221* (MEL 501237, MEL 501238); *s. loc.*, *Preiss 1242* (refer *L. hyssopoides* below).

*Logania hyssopoides* Nees, in *Lehm., Pl. Preiss.*, 1: 368 (1845).

TYPE: 'W.A.' [Western Australia]: ['Ad sinum regis Georgii III' (protologue)][King George Sound], *Preiss 1242*, [Oct 1840 (protologue)] (MEL 401236).

*L. centaurium* Nees, *ibid.* 2: 240.

TYPE: WESTERN AUSTRALIA: ['districtus Sussex' (protologue)], *Preiss 2428*, [19 Dec 1839 (protologue)] (*n.v.*).

Subshrub, 10–30 cm high. Leaves with petiole (0.2–)0.5–2.5 mm long; lamina narrowly ovate, sometimes narrowly elliptic, (5.5–)8–16(–22) mm long, 1.5–4(–5.5) mm wide [length to width ratio (2.5–)3–6]; base attenuate. Inflorescence with peduncle absent or to 3 mm long. Figure 3g–l.

DISTRIBUTION: Western Australia (Avon, Darling, Eyre)(Map 4).

HABITAT: In the northern parts of its range, this subspecies characteristically occur in *Eucalyptus calophylla* (Marri) – *E. marginata* (Karri) open forests, on skeletal grey to white sands overlying laterites. In the Cape Naturaliste-Cape Leeuwin area, it commonly occurs on white calcareous sands, overlying limestone, often in mixed open heathlands. When associated with swampy areas, these are usually ephemeral wetlands which dry out during the year. In the southern parts of this subspecies range, particularly in Cape Le Grand National Park, it occurs in grey sands overlying granite or at Cape Arid National Park it has been recorded in *Eucalyptus tetragona* — *E. incrassata* mallee/high shrubland on pale brown sands (*Green 5156*). The southern populations frequently have broader leaves more typical of subsp. *serpyllifolia*.

NOTES: *Logania serpyllifolia* subsp. *angustifolia* is characteristically slightly larger than the typical subspecies (*viz.* 10–30 cm high whereas the typical subspecies is 5–20 cm high). The leaves of this subspecies have a petiole (0.2–)0.5–2.5 mm long whereas the petioles of subsp. *serpyllifolia* are 0.1–0.8 mm long. The lamina is narrowly ovate or sometimes narrowly elliptic, (5.5–)8–16(–22) mm long, 1.5–4(–8) mm wide [length to width ratio (2.5–)3–6], with an attenuate base. The typical subspecies has very broadly ovate to ovate lamina, 3.2–10 mm long, 2.5–5.2 mm wide [length to width ratio 1–2.6], with a rounded to shortly attenuate base. The peduncle is absent or up to 3 mm long in subsp. *angustifolia*, whereas it is absent or up to 15 mm long in the typical subspecies.

*Cranfield 1140* includes one specimen with very broadly to broadly ovate leaves (length to width ratio 1–1.3, base of lamina more or less rounded) whereas the other specimen has narrowly ovate leaves (length to width ratio 2.9–3.3, base of lamina shortly attenuate). Although the leaves of *Halliday 278* are ovate (length to width ratio 1.8), the base of the lamina of several leaves tends to be attenuate rather than shortly attenuate, therefore, more similar to this subspecies than to the typical subspecies. The leaves of *Perry 184* also has very attenuate leaf-bases. One specimen of *Latus s.n.*



Figure 3. *Logania serpyllifolia* subsp. *serpyllifolia* a. plant showing habit and flowers; b. detail of leaves, stipule and branchlet; c. flower and prophylls; d. open corolla showing inner surface and stamens; e. open calyx showing outer surface; f. pistil. *Logania serpyllifolia* subsp. *angustifolia* g. flowering branchlet; h. flower and prophylls; i. open calyx showing outer surface; j. corolla showing inner surface and stamens; k. pistil; l. detail of leaves, stipule and branchlet. *Logania pusilla* m. plant showing habit and flowers; n. detail of leaves, stipule and branchlet; o. flower and prophylls; p. open calyx showing outer surface; q. open corolla showing stamens; r. pistil. (a-f Conn 3359; g-l Conn 3331; m-r Coveny 5117). Scale bar: a, g & m = 20 mm; b, n & l = 2 mm; c-e, h-j, o-q = 5 mm; f, k & r = 1 mm.

(PERTH 1672541) has leaves that are narrowly ovate to ovate (length to width ratio c. 2.8), with more attenuate bases than usual for the typical subspecies. Another specimen of *Laws s.n.* (PERTH 1672525) has narrowly ovate (8–11 mm long, 2.5–4 mm wide [length to width ratio 2.7–3.6]) which are more typical of this subspecies. The other specimens of this collection are more similar to those of subsp. *serpyllifolia*. *Brittau s.n.* (PERTH 1671464) has some leaves with a length to width ratio of c. 2.4 (typical of subsp. *serpyllifolia*), whereas other leaves have a length to width ratio of c. 3 (typical of subsp. *angustifolia*). Likewise, *Churchill s.n.* (PERTH 1671456) has some leaves with a length to width ratio of c. 2.5, whereas others are c. 4.5.

The stipules are extremely variable in length, possibly because the apex is not persistent, and hence the stipule appears shorter. Usually the stipules are 0.4–1 mm long.

*Logania serpyllifolia* subsp. *angustifolia* is the most common subspecies of this species in the northern parts of the species distribution (Bunbury-Perth area), whereas the typical subspecies is more frequent in the southern parts of the distribution (particularly in the Walpole to Fitzgerald National Park area). Although occasional specimens are difficult to classify into either subspecies, these two subspecies appear to be ecologically distinct, but additional field observations are required.

CONSERVATION STATUS: Not regarded as endangered.

SELECTED SPECIMENS (50 examined): WESTERN AUSTRALIA: South-West Botanical Province: Avon: E of Cranbrook, northern edge of Stirling Range, *Aplin 2019*, 16 Oct 1962 (PERTH 1672061); Darling (Drummond): from Bunbury N along Old Coast Road, turn E into Eaton Drive, 2 kms along Eaton, *Numm 451*, 24 Sep 1985 (PERTH); Darling (Dale): Dwellingup, *Gardner 6480*, 25 Sep 1942 (PERTH 1669907); Darling (Menzies): Albany-Manypeaks area, *Brittau s.n.*, Oct 1951 (PERTH 1671464); between Dunsborough and Cape Naturaliste, *Rechinger 58869*, 20 Oct 1982 (PERTH 1673114); Darling (Warren): Mt Chudalup, S of Northcliffe, *Aplin 1443*, 12 Dec 1961 (PERTH 1673599); Naenup Swamp behind Yeagurup Dunes, c. 20 km SW of Pemberton, *Halliday 273*, 10 Dec 1974 (PERTH 1673610); Eyre: Thistle Cove, Cape Le Grand National Park, *Cranfield 1352*, 18 Nov 1979 (PERTH 1673106); Whoogarup Range, *George 1899*; 2 Dec 1960 (PERTH 1670905); 15 km W of eastern boundary on Fisheries road, Cape Arid National Park, *Green 5156*, 21 Nov 1986 (PERTH 16785784); Swamp Road, N of Bremer Bay, *Laws s.n.*, — Sep 1958 (PERTH 1672541); Off Gardiner River road, approximately 1 km S of junction with Gordon Inlet, *Perry 184*, 6 Aug 1974 (PERTH 1670999); Cape Arid National Park, E of Esperance, *Royce 9862*, 29 Nov 1971 (PERTH 1674072).

## 8. *Logania centralis* Conn, sp. nov.

TYPE: NORTHERN TERRITORY: Central South: Approx. 10 km SE of Tarn of Auber, Merreenie oilfields, *Latz 10008*, 16 Oct 1984 (holo: PERTH 1690434 — lower specimen; iso: CANB, DNA, PERTH 1690434 — upper specimen).

Fruticulus erectus, 15–30(–45) cm altus. Ramuli plus minusve teretes, sulcati, moderate tomentosi; stipulae 0.1–0.2 mm longae. Folia diminuta, squamiformia, sessilia; lamina anguste deltoidea, 3–4 mm longa, 1–1.4 mm lata, moderate tomentosa, margine sparse tomentosa, apice obtuso vel subacuto. Inflorescentiae terminales in brachyblastis productae, 1–7-floribus; flores perfecti; pedunculus absens vel brevisimus; pedicellus 0.4–0.7 mm longus. Calyx 2–2.5 mm longus; lobi deltoidei ad anguste deltoidei, 1.8–2.4 mm longi. Corolla 2.5–3 mm longa, alba; tubus 1–1.5 mm longus; lobi ovati vel leviter oblongis, 1.8–2 mm longi. Stamina ad vel prope sinum inter lobos corollae inserta. Pistillum 2.2–2.5 mm longum, ovario circa 0.5 mm alto, stylo 1–1.2 mm longo et glabro, stigmatate cylindrico. Capsula ovoidea, 2–2.5(–3) mm longa, diametro 2–2.5 mm.

Erect compact, rounded undershrub, 15–30(–45) cm high, appearing leafless, many-branched; branches more or less terete, with many fine longitudinal ridges, moderately

hairy [hairs 60–85 hairs/mm<sup>2</sup>]; hairs 0.1–0.2 mm long, spreading although most hairs slightly retrorse. Leaves reduced, scale-like, becoming slightly rigid, sessile; stipules membranous, reduced to stipular line, 0.1–0.2 mm long, glabrous, apex truncate; lamina narrowly triangular, 3–4 mm long, 1–1.4 mm wide [length to width ratio 2.5–3]; moderately hairy, hairs stiff, bristle-like, to c. 0.1 mm long; margin with scattered minute hairs; apex obtuse to subacute. Inflorescence terminal on short lateral branches (hence appearing axillary), dichasial or botryoidal to metaxymonadic, 1–7-flowered; flowers bisexual (odour not recorded); peduncle absent or reduced; pedicel 0.4–0.7 mm long, moderately hairy (as for branches). Calyx 2–2.5 mm long, moderately hairy (as for branches); lobes triangular to narrowly triangular, 1.8–2.4 mm long, 0.7–0.8 mm wide, margin narrowly membranous (from base to apex), ciliate (hairs c. 0.1 mm long), apex recurved, tapering to subacute. Corolla white, 2.5–3 mm long; tube 1–1.5 mm long, outer surface glabrous, inner surface glabrous at base, densely hairy distally (hairs 0.1–0.2 mm long); lobes ovate to slightly oblong, 1.8–2 mm long, 1–1.3 mm wide, with outer surface moderately hairy basally and medially (hairs to 0.1 mm long, retrorse), often more sparsely hairy or glabrous towards margin, inner surface moderately hairy near base (hairs 0.1–0.2 mm long), minutely and moderately hairy distally (hairs to c. 0.05 mm long), papillose near apex, apex rounded. Stamens inserted in or near sinus of corolla lobes; filaments 0.6–0.7 mm long; with a few scattered hairs basally; anthers 0.7–0.8 mm long. Pistil 2.2–2.5 mm long; ovary c. 0.5 mm long, sparsely glandular-hairy (glands c. 0.05 mm long); style 1–1.2 mm long, glabrous; stigma cylindrical, c. 0.5 mm long. Capsule ovoid, 2–2.5(–3) mm long, 2–2.5 mm wide, base of style persistent (0.3–0.6 mm long), entire style and stigma sometimes persistent, densely minutely hairy (hairs c. 0.1 mm long); seeds 2 per locule, oblong, slightly incurved longitudinally, 2.2–2.5 mm long, 0.7–0.8 mm wide, 0.5–0.6 mm thick, surface minutely papillose. Figure 4g–n.

**DISTRIBUTION:** Western Australia (Giles, Fortescue) and Northern Territory (Central South)(Map 5).

**HABITAT:** Rare or infrequent shrub, occurring in open shrublands or open *Eucalyptus gonyglocarpa* woodland (Latz 10008), also associated with *Plectrachne schinzii* and *Grevillea stenobotrium* under *Eucalyptus setosa*, in red sandy soil.

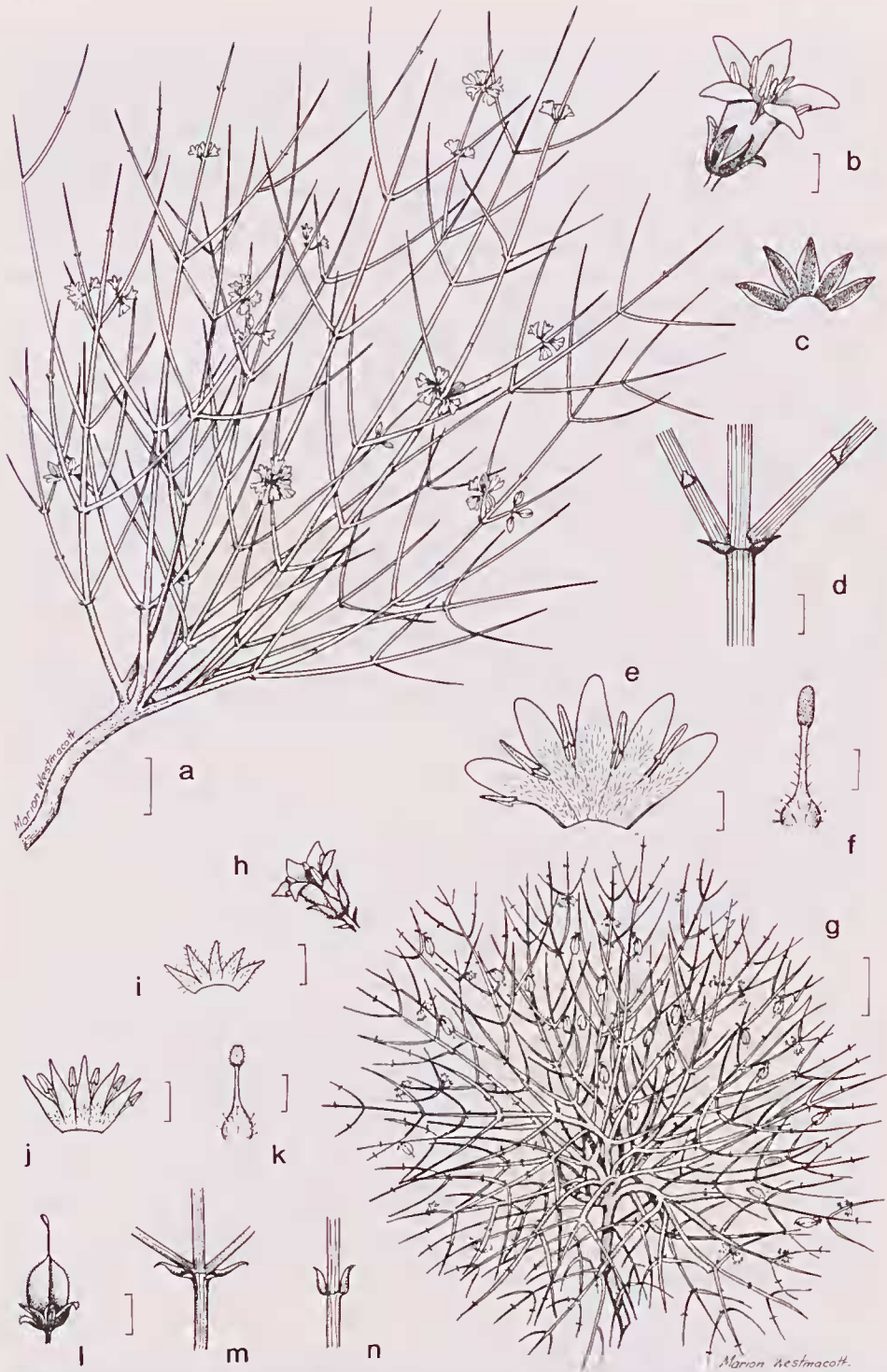
**AFFINITIES:** *Logania centralis* is closely related to *L. nuda*. Both species are erect, compact undershrubs that have greatly reduced leaves, such that the plants appear leafless. The inflorescences are similar, in both they appear to be axillary, but occur on short lateral axes. The corolla lobes are similar in shape and size for both species. However, *L. centralis* has moderately hairy branches (glabrous and minutely papillose in *L. nuda*), moderately hairy lamina with stiff bristle-like hairs (glabrous in *L. nuda*), a shorter pedicel (0.4–0.7 mm long cf. 1–1.7 mm long in *L. nuda*), the calyx slightly longer than for *L. nuda* (2–2.5 mm long cf. 1.5–2 mm long for *L. nuda*), a shorter corolla (2.5–3 mm long cf. (3.5–)4–5.5 mm in *L. nuda*) and in particular a shorter corolla tube (1–1.5 mm long for *L. centralis* cf. (1.5–)2.5–3.5 mm long] for *L. nuda*).

**ETYMOLOGY:** The specific epithet ('centralis') refers to the distribution of this species in Central Australia.

**CONSERVATION STATUS:** Not known.

**SELECTED SPECIMENS (10 examined):** WESTERN AUSTRALIA: Eremaean Botanical Province: Giles: W of Cavanagh Range, *George* 12957, 1 Apr 1975 (NSW, PERTH 1691554); 23 km SE of Docker River turnoff on Giles — Blackstone road, *George* 12962, 2 Apr 1975 (PERTH 1691597); Fortescue: 9 miles N of Cooghenama Rock Hole, *Royce* 1810, 19 May 1947 (PERTH 1691562).

NORTHERN TERRITORY: Central North: 15 km WNW of Lake Surprise, *Latz* 9899, 29 May 1984 (AD, DNA, PERTH 1690027); Central South: S [of] Mt Carruthers, *Latz* 2410, 11 Apr 1972 (MEL



**Figure 4.** *Logania nuda* a. plant showing habit and flowers; b. flower; c. open calyx showing outer surface; d. detail of leaves and branchlets; e. open corolla showing inner surface and stamens; f. pistil. *Logania centralis* g. plant showing habit, flowers and fruits; h. flower and prophylls; i. open calyx showing outer surface; j. open corolla showing inner surface and stamens; k. pistil; l. developing fruit with calyx and style still attached; m & n. detail of leaves and branchlet. (a-f Mulham W806; g-n George 12957). Scale bar: a & g = 20 mm, b, c, e, h-j = 5 mm; d, l-n = 2 mm; f & k = 1 mm.

707288, PERTH 1691589); Approx. 10 km SE of Tarn of Auber, Mereenie oilfields, *Latz 10008*, 16 Oct 1984 (type — PERTH 1690434).

**9. *Logania nuda*** F. Muell., *Fragm.* 1: 129 (1859); *Fragm.* 6: 131 (1868); Benth., *Fl. austral.* 4: 365 (1869); F. Muell., *Key Syst. Victorian Plants* 2: f. 97 (1886); Black, *Fl. South Australia* ed. 2, IV: 689, f. 975 (1957); Willis, *Handbk Plants in Victoria* II: 520 (1972[1973]); Blackall & Grieve, *How to know Western Australian wildfl.* III: 547 (1965); Cunningham *et al.*, *Pl. Western New South Wales* 549, photo (1981); Perry, in Jessop & Toelken (eds), *Fl. South Australia* ed. 4, II: 1039, f. 511E (1986); Conn, in Harden, G.W. (ed.), *Fl. New South Wales* 3: 478 (1992).

LECTOTYPE (HERE CHOSEN): NEW SOUTH WALES: 'sand ridge, Kulkynne' (in Dallachy's hand), 'In collibus arenosis prope Kulkynne ad flumen Murray' — quotation from protologue (not in Dallachy's hand), *Dallachy s.n.*, [1858 (not in Dallachy's hand)], (MEL 501233 — left specimen); isolecto.: (MEL 501233 — right specimen).

Erect, more or less compact, intricately branched undershrub, 15–50(–75) cm high, appearing leafless with many rush-like branches from ground level; branches more or less terete, with many fine longitudinal ridges, often ending in a weak spine, glabrous, minutely papillose (papillae <0.03 mm long). Leaves reduced, scale-like, becoming rigid, sessile; stipules reduced to a stipular line, glabrous, apex truncate; lamina narrowly triangular to triangular 1.5–3.5(–5) mm long, 0.6–1 mm wide [length to width ratio 1.5–5], older leaves reduced to <1.5 mm long, glabrous; margin membranous, often minutely ciliate (hairs <0.1 mm long); apex tapering to subacute. Inflorescence terminal on short lateral branches (hence appearing axillary), variously modified botryoidal and reduced, either to a metaxytriad or metaxymonad, 1–4(–5)-flowered; flowers bisexual, pleasantly aromatic; peduncle absent or reduced; pedicel 1–1.7 mm long, sparsely to moderately hairy (hairs spreading to retrorse, to 0.2 mm long). Calyx 1.5–2 mm long; outer surface sparsely to moderately hairy basally and medially (hairs to 0.2 mm long), hairs often <0.1 mm long or absent near apex, occasionally glabrous throughout; inner surface glabrous; lobes ovate, 1.2–1.8 mm long, 0.6–0.8 mm wide; margin membranous from base almost to apex (0.1–0.2 mm wide, distally narrower), sparsely ciliate (hairs to 0.1 mm long); apex subacute. Corolla white, (3.5–)4–5.5 mm long, c. 1/3 to 1/2 connate; tube (1.5–)2.5–3.5 mm long, outer surface with an occasional hair or sparsely hairy (hairs to 0.2 mm long, more or less retrorse), rarely glabrous, inner surface densely hairy from just above base to mouth (hairs crinkled, 0.2–0.5 mm long); lobes oblong to slightly ovate, 1.8–2.1 mm long, 1–1.2 mm wide, outer surface glabrous or with an occasional hair (hair <0.1 mm long), inner surface densely hairy at base (as for inner surface of tube), papillose and glabrous distally, apex obtuse to rounded. Stamens inserted in or near sinus of corolla lobes; filaments 0.8–1 mm long, glabrous or with a few scattered hairs basally; anthers 1–1.2 mm long. Pistil 3–3.5 mm long; ovary c. 0.6 mm long, sparsely to moderately glandular-hairy (glands 0.1–0.2 mm long); style c. 1.5 mm long, glabrous, rarely with an occasional minute hair; stigma cylindrical to obovoid, 0.7–1 mm long. Capsule ovoid, (4–)5–5.5 mm long, 3–4 mm wide, base of style persistent (0.2–0.4 mm long, sometimes entire style and stigma persistent, glabrous; seeds 2 per locule, oblong, slightly incurved, c. 2.4 mm long, c. 0.7 mm wide, c. 0.6 mm thick, surface papillose. Figure 4a–f.

DISTRIBUTION: New South Wales (South Western Plains and South Far Western Plains); Victoria (Murray Mallee and Lowan Mallee); South Australia (Eyre Peninsula [Eyre & Yorke Peninsulas], northern Lofty Ranges [Mt Lofty Block] and Murray Mallee); Western Australia (southern Eremaean Botanical Province)(Map 5).

HABITAT: Occasional to frequent subshrub, frequently occurring in open scrub, with

*Eucalyptus youngiana*, *Callitris*, *Thryptomene* and *Spinifex*, either in sand dunes (red sand — particularly in Western Australia) or white sand (South Australia), or in gravelly soils of disturbed areas or ironstone ridge formations.

AFFINITIES: This species is closely related to *L. centralis* (refer to 'Affinities' under the former species for discussion).

VERNACULAR NAMES: Bare logania (Willis 1972), leafless logania (Cunningham *et al.* 1981).

SELECTED SPECIMENS (21 examined): NEW SOUTH WALES: South Western Plains: Morma, Ivanhoe 7733, *Milthorpe 5081 & Cunningham*, 24 Nov 1976 (NSW 265696); South Far Western Plains: 45 km NE Pooncarie, *Mulham W806*, Jan 1974 (NSW 266056); 'Montarna' (north block), near S boundary, *Semple 477*, 13 Dec 1977 (NSW 243990).

VICTORIA: Murray Mallee: Murray Desert, *Muetler s.n.* (NSW 243992); Lowan Mallee: 11 km S of Murrayville on track to Nhill, *Rodd 5860 & Gentle*, 4 Nov 1986 (NSW, MEL).

SOUTH AUSTRALIA: Western Pastoral (Gawler Uplands): Gawler Ranges, 21 km SW of Yardea Homestead, *Symon 8092B*, 2 Oct 1972 (ADW 41792); Eyre & Yorke Peninsulas (Central Mallee Plains & Dunes): 15.2 km NW of Coolanie on road past Minbrie Springs and Mount Geharty, *Briggs 1389*, 19 Oct 1983 (AD, CANB 83160086, MEL, NSW 243998); Eyre & Yorke Peninsulas (Northern Myall Plains): Eyre Highway, c. 26 km NE of Kimba, *Orchard 3222*, 8 Jan 1971 (AD 97109019); Mt Lofty Block (Mid-north Wheatlands): Old Coach Rd. Block 73, County Hamley, *Symon 3801*, 11 Oct 1965 (ADW 30133, NSW 243996); Murray Mallee (Upper Murray Lands): 21 km by road NE of Blanchetown bridge, Blanchetown-Waikerie road, *Symon 10972*, Oct 1977 (ADW 51148, PERTH 1666746).

WESTERN AUSTRALIA: Eremaean Botanical Province: Austin: Doney Lagoon, Adalong Station, *Cranfield 7588*, 22 Sep 1988 (PERTH 1690469); Helms: 116 km by road NE of Laverton [on] Warburton Road, Great Victoria Desert, *Beaughlehole & Errey 59982*, 16 Sep 1978 (PERTH 1690442); 4 km S of Neale Junction, Great Victoria Desert, *George 8457*, 12 Oct 1966 (PERTH 1666703); Coolgardie: 3.1 miles (c. W) of Zanthus, *Keighery 537*, 20 Sep 1975 (PERTH 1666673); 10 miles S of Queen Victoria Springs, N of Zanthus, *Royce 5531*, 2 Oct 1956 (PERTH 1666665).

#### 10. *Logania tortuosa* Herbert, *J. Roy. Soc. Western Austral.* 8: 38 (1922).

Lectotype (here chosen): WESTERN AUSTRALIA: Yoting, *Herbert & Wilson 162*, Nov 1920 (MEL 501246); isolecto: *Wilson & Herbert [Herbert & Wilson] s.n. [162]* (PERTH 1599402).

Other possible original material: Western Australia: Yoting, *Wilson & Herbert 596*, Nov 1920 (PERTH 1599399).

Erect compact to low spreading, tufted sedge-like undershrub, 15–30(–50) cm high, appearing leafless, many-branched from ground-level; branches ± terete, with many fine longitudinal ridges, irregularly turned to almost curled distally ('tortuous'), not or only slightly twisted, often ending in a weak spine, glabrous, minutely papillose (papillae <0.03 mm long). Leaves reduced, scale-like, becoming rigid, sessile; stipules membranous, collar-like, 0.4–0.5 mm long, soon torn, glabrous, apex truncate; lamina very broadly to broadly triangular, rarely depressed triangular, 0.9–1.5 mm long, 1–1.4 mm wide [length to width ratio (0.6–)1–1.5]; margin often slightly membranous, with a few scattered minute hairs (especially distally), hairs <0.1 mm long; apex obtuse to subacute. Inflorescence terminal on short lateral branches (hence appearing axillary), metaxymonadic, 1-flowered; flowers bisexual, pleasantly aromatic; peduncle 0.2–0.5(–1) mm long; pedicel 2–3.5 mm long, glabrous. Calyx 2.2–3 mm long, glabrous; lobes triangular to ovate, 2–2.5 mm long, 1.1–1.3 mm wide, margin narrowly membranous from base to apex, ciliate (hairs c. 0.2 mm long), apex subacute to obtuse. Corolla white, 5–8(–9) mm long (see notes below); tube 2–3 mm long, outer surface glabrous basally, moderately hairy near base of lobes (hairs c. 0.1 mm long), inner surface glabrous basally, densely crinkled hairy from c. 2 mm above base to



mouth (hairs 0.6–0.8 mm long); lobes triangular to more or less oblong, 3.5–5 mm long, 1.3–2.6 mm wide, with outer surface moderately hairy on basal half (hairs to 0.1 mm long), more sparsely hairy distally or glabrous (particularly near apex), inner surface moderately hairy near base (hairs 0.4–1 mm long), sparsely hairy distally (hairs to 0.1 mm long), glabrous near apex, apex rounded. Stamens inserted in or near sinus of corolla lobes; filaments 1–1.3 mm long; with a few scattered hairs basally; anthers 1–2 mm long. Pistil 4–5.5 mm long; ovary 1–2 mm long, sparsely to moderately hairy (hairs 0.2–0.4 mm long); style 1.8–2 mm long, sparsely to moderately hairy (hairs as for ovary); stigma club-shaped, almost cylindrical, 1.1–1.5 mm long. Capsule ovoid, 5–6 mm long, 3.5–4 mm wide, base of style persistent (0.5–0.6 mm long), entire style and stigma sometimes persistent, glabrous or sometimes with a few scattered hairs; seeds 5–8 per locule, flattened oblong, 2.3–2.5 mm long, c. 0.8 mm wide, c. 0.5 mm thick, surface more or less smooth. Figure 5.

**TIPIFICATION:** The MEL 501246 sheet of *Herbert & Wilson* is labelled according to the protologue and is here designated as the lectotype. The PERTH 1599402 sheet does not cite a collection number and the order of the collectors are reversed compared to that cited in the protologue (*viz.* *Wilson & Herbert* rather than *Herbert & Wilson*), this specimen is here accepted as the isolectotype of this species. The only other possible original material seen is *Wilson & Herbert 596* (PERTH 1599399). Apart from the incorrect collection number and the typed label clearly being prepared after the protologue was published, it is possible that this collection was part of the original material on which this name is based. However, preference is here given to the former PERTH specimen which has a hand-written label.

**DISTRIBUTION:** Western Australia (southern Eremaean Botanical Province) and South Australia (Eyre and Murray)(Map 6).

**HABITAT:** A frequent to occasional subshrub in open shrubland, associated with *Eucalyptus albidus*, *E. burracoppinensis* & *Allocasuarina* spp., abundant in open heathlands dominated by tall shrubs and Mallee communities with heathy understorey. Occurs in yellow sandy clay to brown clayey sand, yellow earth and deep, well-drained yellow to white sands, occasionally in shallow sands over gravel (lateritic) soils.

**AFFINITIES:** Although the affinities of this species are not known, it appears to be closely related to *L. judithiana*. *Logania tortuosa* is readily distinguished from the latter species by the following characters; the branches of *L. tortuosa* are irregularly turned to almost curled (tortuous), but *L. judithiana* has more or less erect, straight branches; the leaf lamina is 0.9–1.5 mm long in *L. tortuosa*, whereas those of *L. judithiana* are slightly longer (1.5–2 mm long); the inflorescence is metaxymonadic (1-flowered) in *L. tortuosa*, but dichasial and 3–7-flowered in *L. judithiana*; the smaller flowers (calyx 2.2–3 mm long, corolla 5–8(–9) mm long) are pleasantly aromatic in *L. tortuosa*, whereas those of *L. judithiana* (calyx 4.5–5 mm long, corolla (10–)12–16(–18) mm long) are strongly and unpleasant aromatic.

**NOTES:** The inflorescence is metaxymonadic because one pair of prophylls and one pair of metaxephylls occur below the flower. The pair of phyllomes basal to the prophylls are here assumed to be leaves.

The flower is frequently affected by an unknown disease which results in the corolla becoming thick and woody, and often slightly enlarged. These 'woody' flowers frequently resemble old fruits (Fig. 5d).

**SELECTED SPECIMENS** (35 examined): WESTERN AUSTRALIA: Eremaean Botanical Province: Coolgardie: 5 km ESE of Ghooli, c. 15 km ESE of Southern Cross, *Newbey 6019*, 21 Sep 1979 (PERTH 1680471); South-West Botanical Province: Avon: 26 km due SW of Bodallin, *Cranfield 2444*, 16 Sep 1982 (PERTH 16860528); 15 km N of Yarding along Baandee Road, *Cranfield 4836*, 27 Oct

1983 (PERTH 1680455); 30 km by road (c. NE) from Narembeen on Narembeen–Muntadgin Road, *Perry* 527, 16 Oct 1975 (PERTH 1681508); 19.3 km by road (c. S) from Bodallin, *Perry* 537, 18 Oct 1975 (PERTH 1681001); Roe: 10 miles W of Lake King Township, *George* 7296, 3 Sep 1965 (PERTH 1681494); 7 km WSW of Lake Cronin, c. 80 km E of Hyden, *Newbey* 6622, 3 Sep 1979 (PERTH 1680498); W of Salmon Gums, Frank Hann National Park, *Royce* 10230, 10 Dec 1971 (PERTH 1681028).

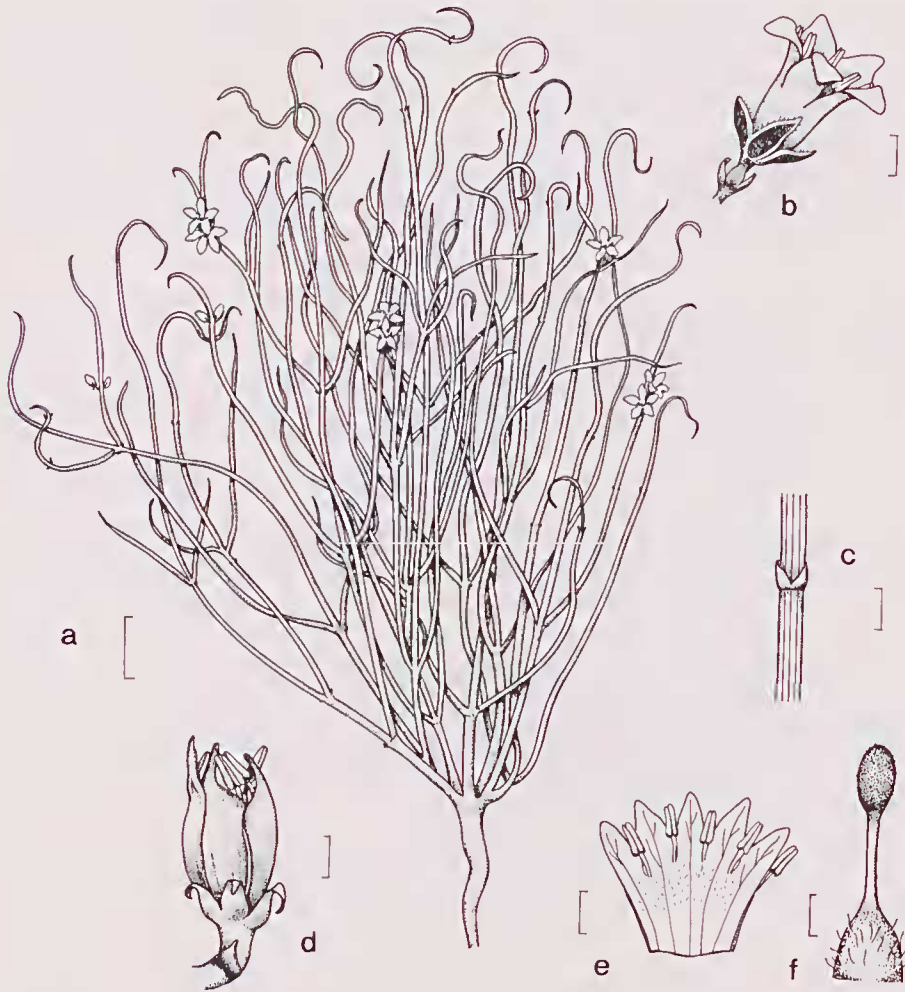


Figure 5. *Logania tortuosa* a. plant showing habit and flowers; b. flower and prophylls; c. detail of leaves and branchlet; d. gall-infected flower, often mistaken for a fruit; e. open corolla showing inner surface and stamens; f. pistil. (all *Conn* 3312). Scale bar: a = 20 mm, b, d & e = 5 mm; c = 2 mm; f = 1 mm.

**11. *Logania judithiana* Conn, sp. nov.**

TYPE: WESTERN AUSTRALIA: Roe: 39.5 km E of Hyden on the Hyden – Norseman Road, Conn 3307 & Scott, 3 Oct 1989 (holo: NSW 225532; iso: AD, MEL, PERTH, RSA).

*Logania nuda* non F. Muell., *sensu* Blackall & Grieve, *How to know Western Australian wildfl.*, III: 547 (1965).

Fruticulus erectus, cariciformis, 20–50(–70) cm altus. Ramuli plus minusve teretes, sulcati, glabri; stipulae 0.6–0.8 mm longae. Folia diminuta, squamiformia, sessilia; lamina deltoidea, 3–4.5 mm longa, 1.8–2.7 mm lata, glabra, margine membranacea, apice longe attenuato. Inflorescentiae terminales in brachyblastis productae, 3–7-floribus; flores perfecti; pedunculus absens vel brevissimus; pedicellus 3–4 mm longus. Calyx 4.5–5 mm longus; lobi ovati, 4–4.5 mm longi. Corolla (10–)12–16(–18) mm longa, alba; tubus 6.5–8 mm longus; lobi ovati vel obovati vel anguste oblongi, 5.5–7 mm longi. Stamina prope sinum inter lobos corollae inserta. Pistillum 6.4–6.5 mm longum, ovario circa 1.8 mm alto, stylo circa 3.4 mm longo et glabro, stigmatibus plus minusve conico ad ellipsoideo. Capsula late ovoidea, 5.5–7.3 mm longa, diametro 5–6.7 mm.

Erect, tufted sedge-like subshrub, 20–50(–70) cm high, appearing leafless, many-branched from ground-level; branches ± terete, with many fine longitudinal ridges, glabrous, usually minutely papillose; papillae less than 0.03 mm long. Leaves reduced, scale-like, becoming rigid, sessile; stipule membranous, collar-like, 0.6–0.8 mm long, soon torn, glabrous, apex truncate; lamina triangular, 3–4.5 mm long [length to width ratio 1.8–2], but apex soon caducous and remaining lamina very broadly triangular, 1.5–2 mm long, 1.8–2.7 mm wide [length to width ratio 0.7–0.9]; dark green to dark red, to almost black, glabrous; margin membranous, particularly towards base; apex long-attenuate, not persistent, remaining ‘apex’ acute. Inflorescence terminal on short lateral branches (hence appearing axillary), dichasial, 3–7-flowered; peduncles absent or reduced; pedicel 3–4 mm long, densely hairy, with spreading hairs 0.4–0.6 mm long; flowers bisexual, strongly and unpleasantly aromatic. Calyx 4.5–5 mm long, outer surface densely hairy (as for pedicel), inner surface with an occasional hair to c. 0.2 mm long (especially on distal half); lobes ovate, 4–4.5 mm long, c. 2 mm wide, medially dark olive-green to dark brown, with margin broadly membranous (more or less abruptly developed from c. 0.8 mm below apex, continuing to base), more or less translucent, apex subacute (lacking membranous margin). Corolla white, (10–)12–16(–18) mm long; outer surface glabrous at base, moderately hairy distally, usually sparser on tube, (hairs 0.2–0.4 mm long); tube 6.5–8 mm long, with inner surface not thickened, sparsely hairy from near base to c 1/2 way up tube (hairs to 0.5 mm long), glabrous in distal half; lobes ovate or obovate to narrowly oblong, 5.5–7 mm long, 2.1–5.6 mm wide, with inner surface sparsely hairy on basal half (hairs to 1.5 mm long), minutely papillose distally, apex rounded. Stamens inserted near sinus of corolla lobes, exerted; filaments 1.2–1.6 mm long, expanded basally, filiform distally, sparsely hairy (hairs to 0.1 mm long); anthers 1.7–2 mm long. Pistil 6.4–6.5 mm long; ovary c. 1.8 mm long, sparsely to moderately glandular hairy (hairs to 0.2 mm long); style c. 3.4 mm long, glabrous; stigma more or less conical to ellipsoid, 1.2–1.3 mm long. Capsule broadly ovoid, slightly flattened laterally, 5.5–7.3 mm long, 5–6.7 mm wide, base of style persistent (to 1.5 mm long), sometimes style and stigma persistent, densely hairy, with hairs mostly c. 0.1 mm long; seeds ?one per locule, flattened oblong, c. 2.2 mm long (?immature), ?1.4 mm wide, c. 0.8 mm thick, surface papillate. Figure 6.

DISTRIBUTION: Western Australia: (Eremaean Botanical Province: Austin; South-West Botanical Province: Avon, Roe)(Map 5).



Figure 6. *Logania judithiana* a. plant showing habit and flowers; b. detail of leaves and branchlet; c. branchlet showing young leaves and stipules; d. flower and prophylls; e. open corolla showing inner surface and stamens; f. pistil; g. fruit and calyx; h. open calyx showing outer surface. (all *Com* 3307). Scale bar: a = 20 mm, b, c & f = 2 mm; d, e, g & h = 5 mm.

**HABITAT:** Usually occasional to locally frequent in low *Allocasuarina*- and Proteaceae-dominated shrubland or low closed or open heath formations dominated by *Eucalyptus*, *Banksia laevigata*, *Leptomeria*, *Hakea*, *Grevillea* and *Verticordia*, sometimes in Mallee community with closed shrub understorey, commonly occurring in sandy lateritic soil.

**ETYMOLOGY:** This species is named in honour of my colleague and friend, Judith A. Scott, joint collector of the type material.

**AFFINITIES:** *Logania judithiana* is closely related to *L. exilis*. This species is a more robust plant than *L. exilis*. The branches of *L. judithiana* are (2-)2.5-3.8(-4) mm in diameter (average 3.1 mm), whereas those of *L. exilis* are 1.1-1.5(-2.1) mm in diameter (average 1.4 mm). *Logania judithiana* has longer stipules (0.6-0.8 mm long) compared to those of *L. exilis* (c. 0.3 mm long). The membranous margin of the calyx of *L. judithiana* is c. 0.5 mm wide, whereas it is only 0.1-0.2 mm wide in *L. exilis*.

**NOTES:** The fruits of this species are poorly known. The capsule and seed measurements are only based on the five fruiting collections examined (*viz.* *Aplin 2852*, *Gardner 14608*, *15013* & *15908* and *Brown 216*).

**CONSERVATION STATUS:** Not regarded as endangered.

**SELECTED SPECIMENS** (38 examined): WESTERN AUSTRALIA: Eremaean Botanical Province: Austin: 20 km S of Paynes Find, *Wilson 8620*, 7 Aug 1969 (PERTH 1689444); South-West Botanical Province: Avon: Corrigin, ESE of Perth, *Anonymous 3*, Sep-Oct 1968 (PERTH 1687301); Roe: 26 miles E of Lake King, *Aplin 2852*, 9 Nov 1964 (PERTH 1688324); Mt Holland Road, *Blackall 1250*, 2 Nov 1931 (PERTH 1688448, 1688847); Nature Reserve no. 28047, western side of vermon proof fence, 1 km S of Hyden-Norseman road, 50 km E of Hyden, *Brown 216*, 18 Oct 1984 (PERTH 1665200); 39.5 km E of Hyden on the Hyden - Norseman Road, *Conn 3307* & *Scott*, 3 Oct 1989 (NSW 225532); 90 Mile Tank, Norseman Road, 90 km E of Armadale - Ravensthorpe Road near Norseman Road junction, Frank Hann National Park, *Conn 3413* & *Scott*, 15 Oct 1989 (AD, CHR, MEL, NSW 226424, PERTH); 51 miles W of Daniell - Lake King, *Demarz 4646*, 10 Oct 1973 (PERTH 1688405); inter Forrestania & Digger's Rock, *Gardner 15013*, 9 Dec 1964 (PERTH 1688421); 2 km NE of Holt Rock on road to Hyden, *Haegi 1223*, 5 Oct 1976 (PERTH 1688901); 41.8 km by road (approx. E) from Hyden on East Road, *Perry 454*, 13 Oct 1975 (PERTH 1687328); 74 km W of Kumarl, *Wilson 5707*, 10 Oct 1966 (PERTH 1688413); Locality unknown: *Gardner 14608* & *15908* (PERTH 1687859).

## 12. *Logania exilis* Conn, sp. nov.

**TYPE:** WESTERN AUSTRALIA: Roe: c. 95 km SE of Southern Cross, *George 15099*, 14 Mar 1978 (holo: PERTH 1287028; iso: MEL, NSW 274535).

Fruticulus erectus cariciformis, 20-60 cm altus. Ramuli plus minusve teretes, sulcati, glabri; stipulae circa 0.3 mm longae. Folia diminuta, squamiformia, sessilia; lamina anguste deltoidea vel peranguste deltoidea, 9-13 mm longa, 0.8-1.4(-1.6) mm lata, glabra, margine anguste membranacea vel non membranacea, apice longe attenuato. Inflorescentiae terminales in brachyblastis productae, 3-5-floribus; flores perfecti; pedunculus absens vel brevissimus; pedicellus 1.5-3 mm longus. Calyx 4.5-6 mm longus; lobi anguste ovati vel anguste deltoidea, 3.8-5.5 mm longi. Corolla 9-13 mm longa, alba; tubus 5.2-8 mm longus; lobi plerumque late ovati vel late obovati, interdum ovati vel obovati, 3-5 mm longi. Stamina prope sinum inter lobos corollae inserta. Pistillum 6-6.3 mm longum, ovario circa 0.6-0.8 mm alto, stylo 4-4.3 mm longo et glabro, stigmatibus plus minusve cylindricis vel ellipsoideis vel obovoideis. Capsula late ovoidea, 5-5.5 mm longa, diametro 4.5-5 mm.

Erect, tufted sedge-like subshrub, 20-60 cm high, appearing leafless, many-branched from ground-level; branches  $\pm$  terete, with many fine longitudinal ridges, glabrous, usually minutely papillose; papillae less than 0.03 mm long. Leaves reduced, scale-

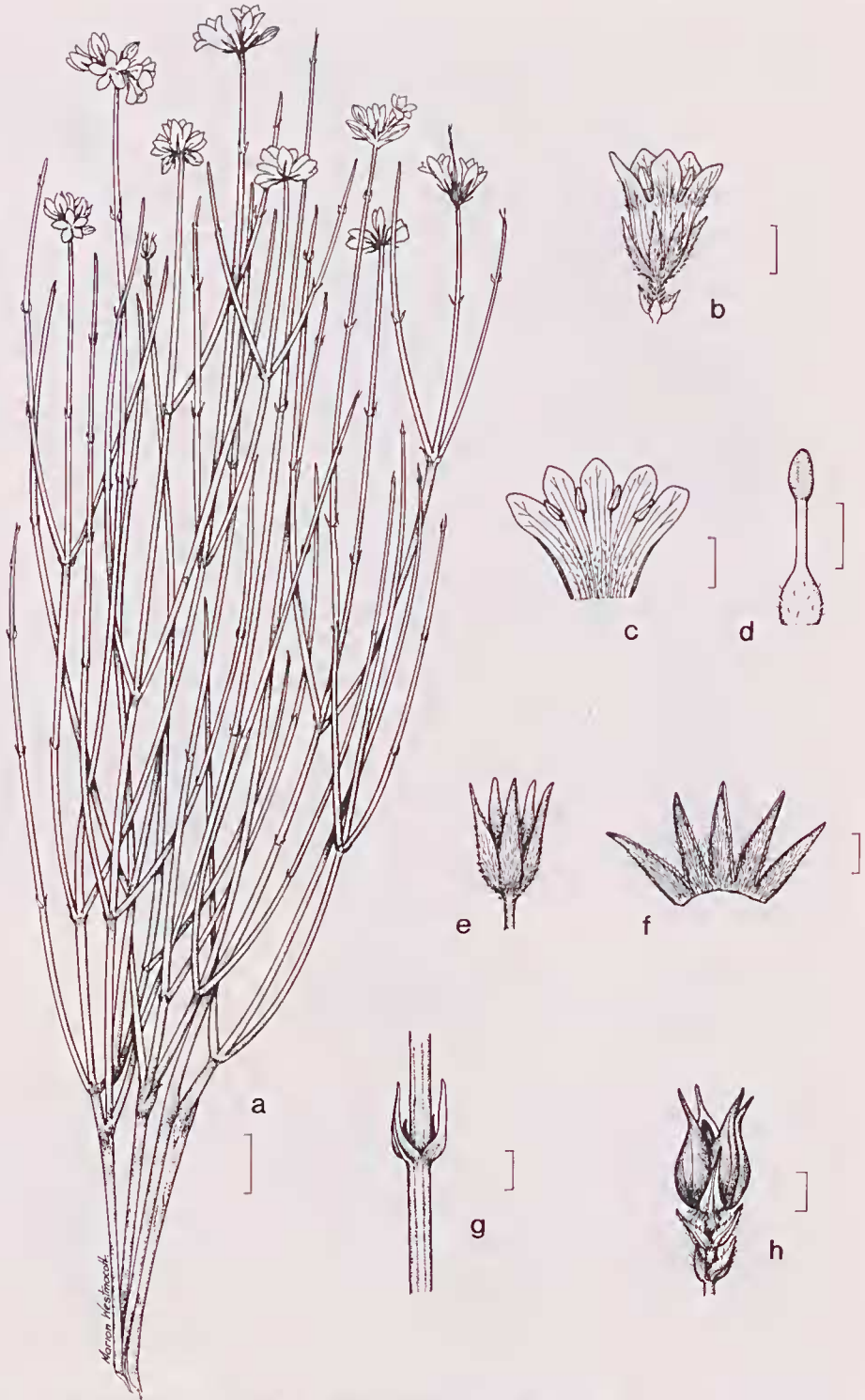


Figure 7. *Logania exilis* a. plant showing habit and flowers; b. flower and prophylls; c. open corolla showing inner surface and stamens; d. pistil; e. calyx; f. open calyx showing outer surface; g. detail of leaves and branchlet; h. fruit and calyx. (all George 15099). Scale bar: a = 20 mm, b, c, e & f = 5 mm; d, g & h = 2 mm.

like, becoming rigid, sessile; stipule membranous, collar-like, c. 0.3 mm long, soon torn, glabrous, apex truncate; lamina narrowly triangular to very narrowly triangular, 9–13 mm long [length to width ratio 4.8–8], but apex caducous and remaining lamina narrowly triangular, 3.5–6 mm long, 0.8–1.4(–1.6) mm wide [length to width ratio (2.8–)3–4.4(–5)]; dark green, becoming paler, glabrous; midrib slightly raised on abaxial surface; margin not or only narrowly membranous; apex long-attenuate, not persistent, remaining 'apex' more or less acute. Inflorescence terminal on short lateral branches (hence, appearing axillary), dichasial, 3–5-flowered; peduncles absent or reduced (to c. 0.5 mm long); pedicel 1.5–3 mm long, densely hairy, with hairs spreading (0.4–0.6 mm long); flowers bisexual, faintly to mildly aromatic (musk-like)(*George 15099*). Calyx 4.5–6 mm long, outer surface densely hairy (as for pedicel), inner surface sparsely hairy on distal half (hairs 0.5–0.7 mm long); lobes narrowly ovate to narrowly triangular, 3.8–5.5 mm long, 0.8–1 mm wide, dark olive-green, with margin paler from just below apex to base, not or only slightly membranous, apex attenuate. Corolla white, 9–13 mm long; outer surface glabrous at base, sparsely to moderately hairy distally, usually sparser and shorter on tube, (hairs to 1 mm long); tube 5.2–8 mm long, with inner surface not thickened, moderately hairy throughout (hairs to 0.5 mm long); lobes usually broadly ovate to broadly obovate, sometimes ovate to obovate, 3–5 mm long, 2.2–3.5 mm wide, inner surface with a dense hairy zone from just above the base to almost 1/2 way up lobe (zone of hairs 1–1.5 mm wide)(hairs to 1.3 mm long), glabrous or with an occasional hair distally, apex rounded. Stamens inserted near sinus of corolla lobes, exerted; filaments 0.6–0.7 mm long, expanded basally, filiform distally, sparsely hairy (hairs to 0.1 mm long); anthers 1.2–1.7 mm long. Pistil 6–6.3 mm long; ovary c. 0.6–0.8 mm long, sparsely to moderately glandular hairy (hairs 0.1–0.4 mm long); style 4–4.3 mm long, glabrous; stigma more or less cylindrical or ellipsoid to obovoid, 1–1.3 mm long. Capsule broadly ovoid, slightly flattened laterally, 5–5.5 mm long (excluding persistent style base), 4.5–5 mm wide, base of style persistent (to c. 1 mm long), glabrous or sometimes minute hairs persistent, hence surface moderately hairy, with hairs to c. 0.1 mm long; seeds many per locule, ?immature, flattened oblong, c. 1.8 mm long, c. 0.6 mm wide, c. 0.4 mm thick, surface papillate. Figure 7.

DISTRIBUTION: Western Australia (South-West Botanical Province: Roe)(Map 3).

HABITAT: This species occurs in sand heaths and disturbed areas with *Allocasuarina* and *Eucalyptus* spp., in pale yellow sandy loams, often with laterite.

ETYMOLOGY: The specific epithet ('exilis') refers to the slender habit of this new species.

AFFINITIES: This species is closely related to *L. judithiana*. The differences are discussed under the latter species (see above).

NOTES: Fruits of this species are only known from a single collection (*viz.* *George 15099*). This collection only had a few fruits and these appear to contain only immature seeds.

SELECTED SPECIMENS (5 examined): WESTERN AUSTRALIA: South-West Botanical Province: Roe: *s. loc.*, *Gardner s.n.* (PERTH 1286986); near Mount Holland, Rabbit Proof Fence, *Gardner s.n.*, — Sep 1929 (PERTH 1287001); near Mount Holland, *Gardner s.n.*, — Sep 1929 (PERTH 1286978); c. 95 km SE of Southern Cross, *George 15099*, 14 Mar 1978 (type — PERTH 1287028); c. 21 km S of South Ironcap, 2.6 km S of turnoff to main road to Lake King (S of AMAX site), *Keighery 901*, 2 Oct 1976 (PERTH 1286994).

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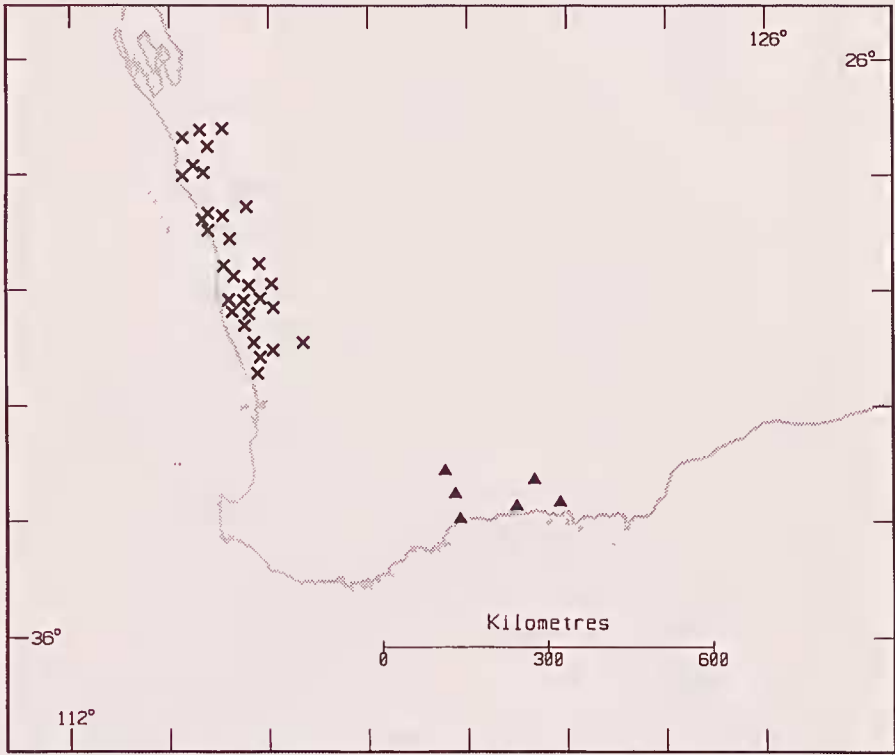
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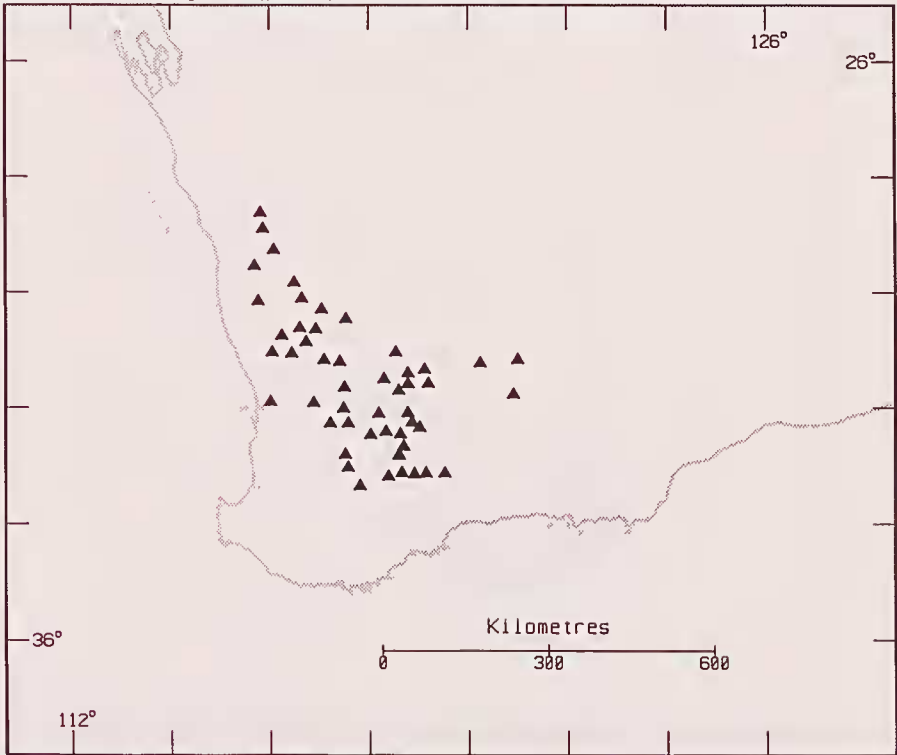
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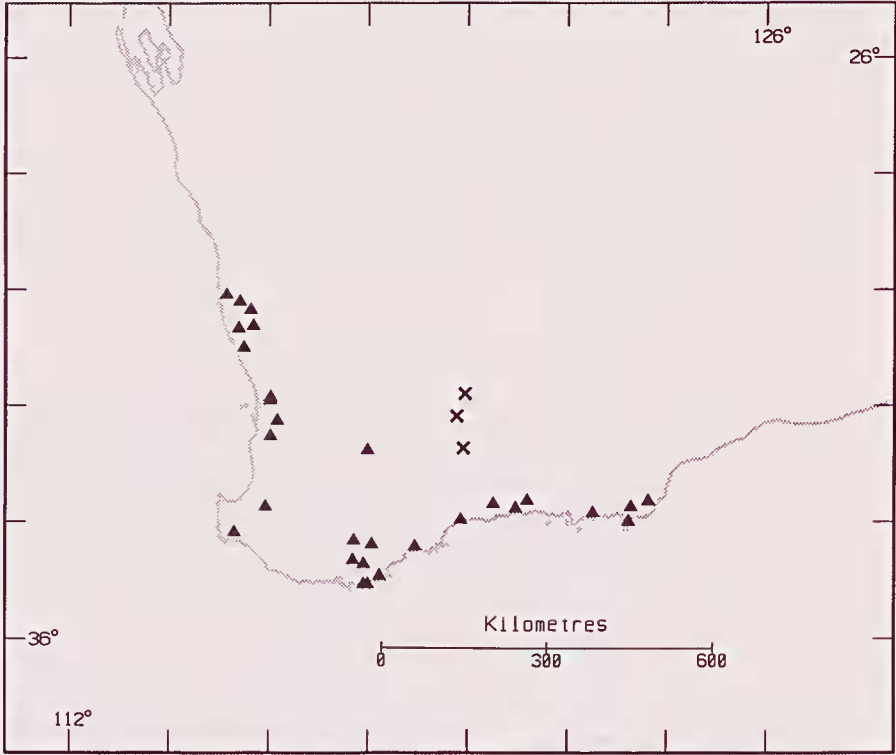




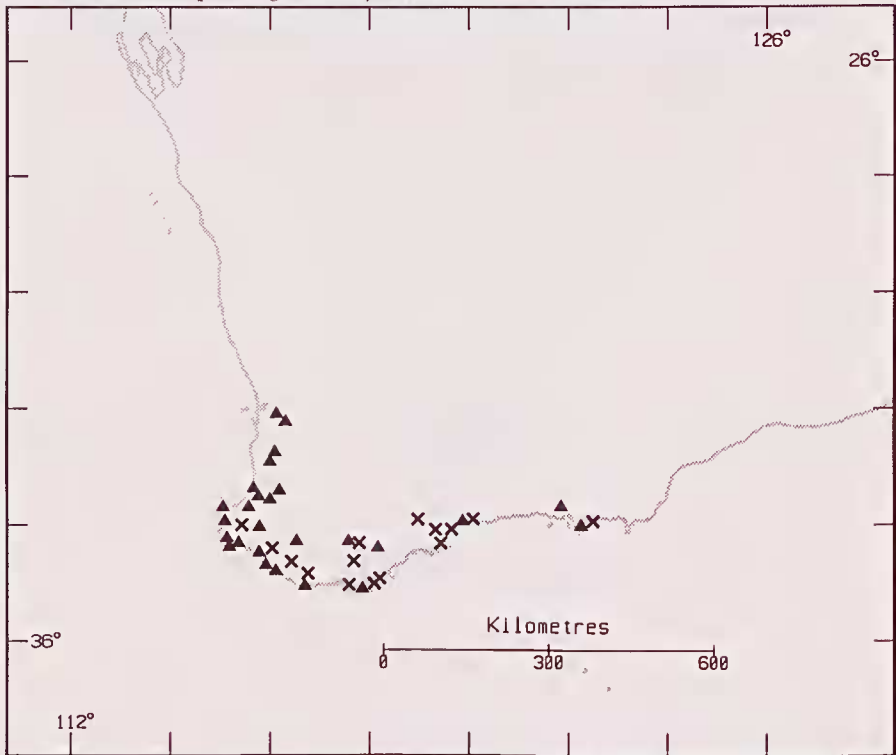
Map 1. Distribution map of *Logania spermacocca* (x) and *L. callosa* (▲).



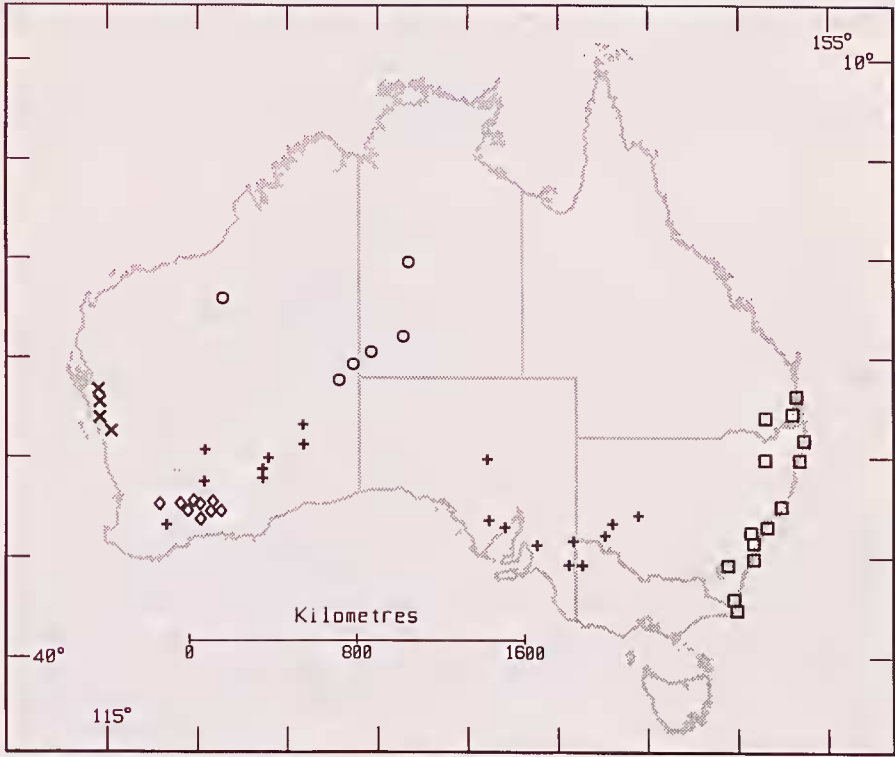
Map 2. Distribution map of *Logania flaviflora*.



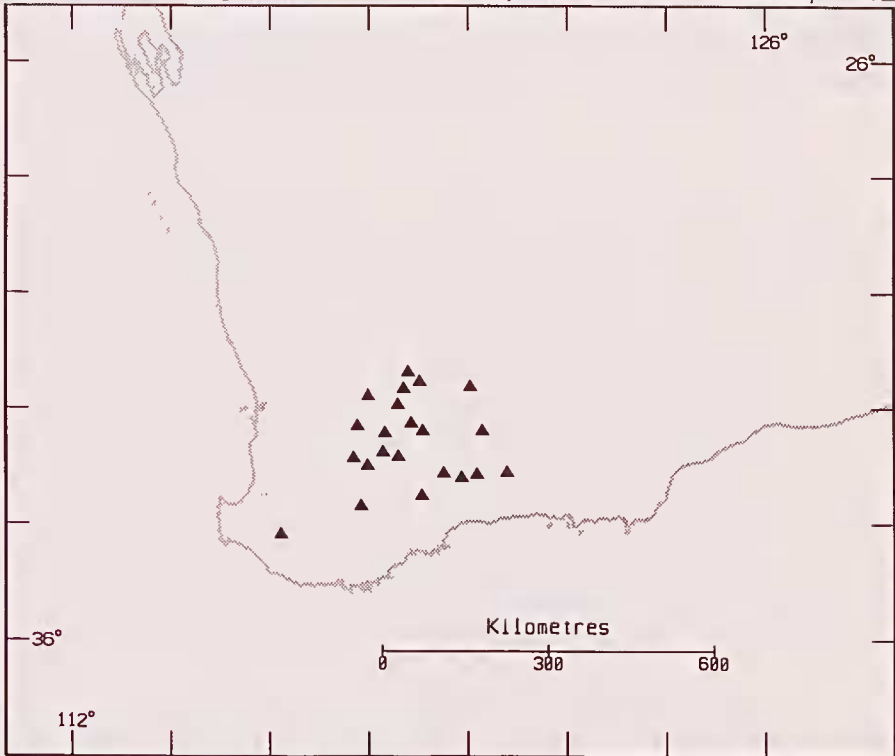
Map 3. Distribution map of *Logania campanulata* (▲) and *L. exilis* (x).



Map 4. Distribution map of *Logania serpyllifolia* subsp. *serpyllifolia* (x) and *L. serpyllifolia* subsp. *angustifolia* (▲).



Map 5. Distribution map of *Logania biloba* (x), *L. centralis* (o), *L. judithiana* (◇), *L. nuda* (+) and *L. pusilla* (□).



Map 6. Distribution map of *Logania tortuosa*.

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